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ON
DIET AND REGIMEN
IN
SICKNESS AND HEALTH.

DR. DOBELL.

FIFTH EDITION

ON

DIET AND REGIMEN

IN

SICKNESS AND HEALTH

AND

ON THE INTERDEPENDENCE AND PREVENTION OF DISEASES AND THE DIMINUTION OF THEIR FATALITY

BY

HORACE DOBELL, M.D.
SENIOR PHYSICIAN TO THE ROYAL HOSPITAL FOR DISEASES OF THE CHEST;
PHYSICIAN TO THE ROYAL ALBERT ORPHAN ASYLUM,
ETC., ETC.

FIFTH AND REVISED EDITION.

LONDON:
H. K. LEWIS, 136 GOWER STREET, W.C.
1872.

151. n. 170.

In Memoriam

ONCE MORE I MAY REPEAT THE THANKS,

EXPRESSED IN ALL THE FORMER EDITIONS OF THIS WORK,

FOR THE GENEROUS ASSISTANCE I HAD RECEIVED

IN MY SCIENTIFIC CALCULATIONS

FROM THE ARITHMETICAL SKILL OF MY DEAR OLD FRIEND

J. J. FARRANTS, F.R.C.S.

LATE PRESIDENT OF THE MICROSCOPICAL SOCIETY;

WHOSE GENIAL SPIRIT

HAS NOW FOR EVER PASSED

BEYOND THE REGIONS OF SCIENCE AND CALCULATION

TO

"THAT UNKNOWN, TRACKLESS LAND, FUTURITY;
GREAT HERITAGE, WHERE NO MAN KNOWS HIS PART."

PREFACE TO FIFTH EDITION.

This work was much enlarged and nearly re-written in its last edition just two years ago, and it has now been thoroughly revised.

Much new matter has been introduced, and some of the old re-arranged.

With the valuable assistance of my friend Mr. J. L. Johnston, late Principal Inspector of Customs Laboratories, the Alcohol Table has been completely re-cast, and is now, I believe, as nearly perfect as it is possible to make it. The Articles on Wines and on House-Drainage and the Orphanage Diet Table are quite new; and other alterations will be found, which I hope will make the book more worthy of the favourable reception it has already received.

84 Harley Street. *May*, 1872.

PREFACE TO FOURTH EDITION.

My "Manual of Diet and Regimen" which appeared in 1864 having run through two editions in its first year, I published a third and revised edition in January, 1865. This has long been out of print and, as the demand for the Manual did not decrease, I have been repeatedly urged to prepare a fourth edition. After many delays, from the interruption of other professional work, I have, at last, rewritten the book, adding much new matter and incorporating several contributions, which I have published from time to time, on subjects relating to the preservation of health. I hope it will be found that I have thus materially increased the usefulness of the work without adding inconveniently to its length. My object and endeavour has been to produce a small book founded upon accurate scientific data but essentially practical: a book from which a doctor may refresh his memory, and at the same time one which he may safely place in the hands of his patients, to enlighten them on some of those important points which ought to be understood by the non-professional, and to teach them how vast and intricate is the science and art of rational medicine. Thus, to make them more intelligent patients, and in so doing to remove some of the doctor's difficulties in healing them when they are sick, and when they are well to strengthen his hands in the preservation of their health.

It gives me great pleasure to be able to renew the thanks I expressed in 1864 to my friend Mr. Farrants, at that time President of the Microscopical Society, for the valuable assistance I have so frequently received from his remarkable analytical and arithmetical talents.

84 Harley Street. *May*, 1870.

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CHAPTER I.

PRELIMINARY REMARKS.

THE INTERDEPENDENCE OF DISEASES—NARROW SPECIALITIES AND BROAD DEPARTMENTS IN THE PRACTICE OF MEDICINE—NORMAL DIET—ERRORS IN DIET—THE DIET OF DISEASE—FOOD, HEAT, AND MOTION—GETTING FAT AND GETTING THIN—ALCOHOL, ITS PROPER PLACE IN DIET—REGIMEN—THE REGULATION OF HABITS—HOUSE-DRAINAGE—IMPORTANCE OF SLEEP—PROPER HOURS FOR MEALS—DISINFECTION—PSEUDO-MEDICAL DOGMAS, ALLOPATHY, HYDROPATHY, HOMŒOPATHY, KINESIPATHY, AND RATIONAL MEDICINE.

In the practice of Rational Medicine, there are many subjects upon which the wise Physician is always glad to find that his patient has some knowledge as well himself. Among these I know of none more important than the interdependence of Diseases and the principles of Diet and Regimen.

There are few medical questions which so test the depth and extent of a doctor's acquirements as THE INTERDEPENDENCE OF DISEASES—by which I mean, the way in which one disease leads to another, substitutes another, aggravates, or relieves another; the way in which disease appearing at one part of the body, depends upon the derangement of another part, perhaps distantly separated; the way in which disease of one kind in an ancestor, leads to disease of several different kinds in the descendants; the way in which one general morbid cause may produce different effects upon different persons, according to the conditions of health in which they happen to be at the time; and numberless other similar phenomena.

These are matters of the highest importance in the right management and treatment of disease, yet they are so little understood that the pains taken by a conscientious doctor in their investigation are not appreciated by the majority of persons. Thus it is that patients so often fail to discriminate between the wisdom of the man who will not prescribe for a part of the body until he has learnt the condition of the whole, and the *ad captandum* ignorance of another man who will prescribe unhesitatingly for a disorder of the whole body without previously ascertaining whether it depends upon disease of a part.

The chief objection to *specialities* in medical practice is the danger, that the doctor who treats but one part of the body may lose sight of the interdependence of diseases. This must always be a grave objection to very *narrow* specialities, but it does not apply to the broad division of the practice of medicine into *Departments*—that is to say, such a reasonable application of the principles of the "division of labour" as shall enable each practitioner, not only to completely master the department of Medicine which he selects for special study, but to advance the general knowledge of the profession by his investigations and experience.

For example, diseases of the ear are often dependent upon, or are connected with, diseases of other parts of the body; and the doctor who confines his practice to diseases of the ear may be in danger of losing sight of the broad facts of medicine, and in attempting to cure the ear may damage the body; but by extending his practice to all the organs of special sense, which might fairly form a *department of Medicine,* he would be obliged to take in a range of observation and thought which would enforce a knowledge of the interdependence of diseases.

Again—Diseases of the heart and arteries are intimately connected with those of the lungs and throat; diseases of the lungs with those of the heart, arteries and windpipe; diseases of the brain with those of the lungs, heart and arteries; and all of these are often inseparably connected, in the relation of cause or effect, with affections of the stomach, liver, pancreas, kidneys, intestinal glands, etc. etc. Therefore, for a doctor to limit his practice to diseases of the heart, to diseases of the throat, to diseases of the lungs, or to diseases of the windpipe, is to constitute a *speciality so narrow* that he is in danger of losing sight of the great principles of medicine. If, on the other hand, he selects for special study and practice such a broad department as Diseases of the Chest—that is to say, of all the respiratory and circulatory organs, and the associated processes of digestion and assimilation—he will be obliged to take in a range of observation and thought necessitating a constant remembrance of the interdependence of diseases, and he will be competent to deal with all classes of disease as well as those peculiar to his own department. I have instanced Diseases of the Chest because it is one of most important "lines" of practice, and the one with which I am most intimately associated, but the same remarks apply to Obstetrics, to Fevers, to the Diseases of Children, and to other large divisions of medicine. Thus *departments* of medical practice may be wisely selected by different medical men for special study—but *narrow specialities* are dangerous and objectionable, unless those who confine themselves to them are content to act simply as the assistants of the more general physicians and surgeons, which is not likely to be the case. For those who may be interested to pursue this subject further I have introduced a chapter *"on the Germs and Vestiges of Disease."* (See Chapter X.)

DIET is so little understood that, very often, those are the best off who abstain from all attempts to meddle with it and are content to follow the dictates of their instinct. This, of course, ought not to be the case, for diet, properly understood, may be made a powerful agent in the restoration and maintenance of health; and errors of diet are at all times capable of becoming serious causes of disease.

But, unfortunately, interference with diet, like all good things, is particularly open to abuse, for nothing is easier than to lay down a complicated code of restrictions and rules as to "what to eat and what to drink" and the patient is very apt to think that the skill of the doctor increases with the number and variety of his orders. But those who understand the principles of diet know that the reverse is much nearer to the truth, and that learning and skill in dieting a patient, are shown by the wisdom with which the doctor, instead of meddling with unimportant details, seizes upon the few essential points on which the vice or virtue of a diet will generally be found to turn. Thus, in a case of diabetes, the ignorant intermeddler may order fifty restrictions without doing his patient the slightest good; whereas, the doctor who understands the nature of the disease and the principles of diet, will speedily relieve his sufferings by telling him to take whatever he likes, so long as he touches nothing which contains starch or sugar. Thus, again, I have often seen patients suffering from acid dyspepsia who have been ordered and forbidden so many different articles of food that their lives were rendered miserable, without the slightest relief to their complaint, whereas, by forbidding them to take cheese and malt liquor, the chief factors of their malady, and allowing them to eat and drink whatever else they pleased, their sufferings have been speedily removed and their lives made enjoyable.

It is absolutely necessary that he who ventures to interfere with a person's diet should first understand the principles upon which the food of health is regulated in nature; and nothing assists the intelligent doctor more in getting his orders carried out, than for his patient, as well as himself, to be acquainted with this subject. Ignorance and stupidity are the constant obstacles in the proper regulation of these matters. To elucidate this part of the subject I have drawn up a brief statement of the *"Essentials of a normal diet."* This is illustrated by a set of tables, showing the method by which diets may be arranged so that they shall equally well support the human body in a state of normal health and strength, whether they consist of a complicated list of expensive articles, or, of no more than Bread, Cheese, Butter, Cresses and Water. (See Chapter IV.)

The advances of science have, of late, thrown most important light upon the connection between FOOD and FORCE, a subject of the greatest interest to all, whether medical or not; for, as we all take food and all desire to be strong, we are unavoidably fascinated by the inquiry what kind of food will give us the greatest amount of strength. I have not hesitated, therefore, to introduce a short Chapter *"On Food, Heat and Motion."* (See Chapter III.)

The question of *"getting fat or getting thin,"* whether in health or disease, is one inseparable from the subject of food and force, for we have discovered that heat is but a mode of motion,* and that those elements of food capable of liberating the largest amount of heat, may be utilized as accumulators of fat by economising the motion and heat of the body, and *vice versa.* In the Chapter "*On Food, Heat and Motion,*" I have introduced a table, shewing the composition of some of the most important articles of food, and the amount of heat to be got out of equal quantities of each, and I have aiso given directions how to estimate the amount of mechanical force equivalent to a given quantity of heat. In order to elucidate the importance of fat, and the subject of getting fat or losing fat by alterations of diet, I have introduced some remarks on "Bantingism," on the means which promote the accumulation of fat, and on the importance of distinguishing between solid and liquid fat. (See Chapter VI).

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* See Prof. Tyndall's Lectures: *"Heat a Mode of Motion."*

From what I have already said, and from the articles referred to, it must be clear that nothing can take precedence of proper food among the means for the preservation of the public health; and when health is lost, whether by unavoidable disease or by other causes, nothing can be more inportant than to understand the leading principles which should guide us in altering the food to meet the conditions of disease, and thus to convert *diet* into a powerful instrument for the restoration of health. This is a subject which could not be fully discussed in a small work like the present, but I have given a Chapter "*On some Principles of Diet in Disease,*" containing the substance of a lecture which I delivered at the Royal Hospital for Diseases of the Chest, in 1865.

The subject of ALCOHOL, which has of late years occupied so much attention, both in the scientific and in the religious world, and which has been so grievously misrepresented and misunderstood, is now placed upon a more reasonable footing, some plain facts having been unquestionably established by the dispassionate investigations of practical and scientific men. In this country we are particularly indebted to Dr. Anstie and Dr. Parkes for their investigations on this subject. (See Appendix.)

It is now quite certain, as I have long maintained, that alcohol is food—that is to say, that it is consumed in the body by a process of oxidation similar to that which other kinds of food undergo, that during its combustion force is liberated, and the demand for other kinds of food diminished. Alcohol, therefore, is able to save the combustion of the elements of tissue formation, by vicarious oxidation of itself.

It is quite certain that alcohol is one of the most readily oxidisable substances capable of being introduced into the animal organism. In this consists its chief value and its chief danger; for, on the one hand, it is able to replenish the lamp of life with so little tax upon the digestive functions and with so little loss of time, that nothing can take its place *when these are the desiderata* of most urgent import. But, on the other hand, this extraordinary facility for oxidation makes the presence of alcohol in the system a most dangerous impediment to the combustion of those less readily oxidisable matters, the full and regular combustion of which is absolutely essential to the continuance of normal health.

It is quite certain that alcohol is not an indispensable article of daily food; a normal diet may be perfectly well constructed without it, and a healthy person, under favourable circumstances, can live without it, just in fact, as the lower animals do. But it is also quite certain that alcohol is a most blessed gift of Providence, when rightly understood and wisely used. It is the endowment of man with those higher attributes which principally distinguish him from the brutes, that constitutes the element in his nature which has made it necessary to his welfare that

Providence should give him this peculiar article of food in addition to all those placed within the reach of the less intellectual animals.

Thus it is a fact, that while man is brutalized by the *abuse* of alcohol, its proper *use* is one of his distinctions from the brutes.

Alcohol may perhaps be best described as a *Medicinal Food.* It is essentially a poison, although in its proper use it is an indispensable element in the life and happiness of highly civilized society. But it ought always to be regarded as a most treacherous friend.

I have drawn up an *"alcohol table,"* (see Chapter V.), the result of many careful analyses of each article so as to present a fair average result, from which it can be seen, at a glance, what quantity by measure of each of the ordinary fermented liquors represents one ounce by weight of absolute alcohol. The table includes a statement of the proportion of carbon, and of some other matters, contained in fermented liquors, besides the alcohol; and it must always be remembered that different kinds of fermented liquors represent many other influences for good or evil, in a dietetic point of view, in addition to those possessed by the alcohol, all of which require consideration in selecting the particular beverage suitable to any given case.

It will be observed that I have omitted alcohol from all the *Tables of Normal Diet,* leaving it to be added in any form and quantity that circumstances may render most advisable. According to my own experience, based upon long and careful observation, an average-sized adult man taking moderate exercise may drink with advantage enough fermented liquors, each 24 hours, to represent from one to two ounces avoirdupois of *absolute* alcohol* —provided it be always diluted to the extent of 10 fluid ounces (half-a-pint imperial) of water or some other unfermented liquor to each ounce avoirdupois of *absolute* alcohol, and that it be taken when there is food in the stomach. (See Chapter V).

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* It will be seen by the *resumé* of Dr. Parkes' and Count Wollowicz' recent

Regimen. The regulation of habits could not be fully discussed without involving physiological, and other details which would have far over-run the limits of this book.—I have, therefore, contented myself with laying down, as concisely as possible, such rules as my own experience, added to that of others, has taught me are most necessary and most suitable to the generality of persons. They must, of course, be modified to suit peculiar constitutions, idiosyncrasies, and other circumstances, and to meet the various conditions of disease. In connection with these Rules for Maintaining Vigorous Health, I have introduced an article *"on the Proper Hours for Meals,"* also a number of valuable suggestions *"on House Drainage,"* for which I am indebted to an experienced architect, (see Chapter II.); and an important leading article from the Times of August 17th, 1869, suggested by a letter of mine on *"London Noise and London Sleep,"* which had appeared on the 13th. (See Appendix.) On the subject of exercise and training, in addition to the rules I have laid down, I advise everyone, medical or not, to read "A System of Physical Education," by Archibald Maclaren, of the Gymnasium, Oxford, an admirable treatise issued from the Clarendon Press in 1869.

As a necessary part of a work like the present, having for its object the preservation of health, I have added a chapter (Chapter VIII.) on *Disinfection,* with rules for preventing the spread of the "Catching Diseases." And in Chapter IX. will be found some *special directions for the sick room.*

experiments (see appendix) that their results confirm the opinion at which I had long before arrived, by a different process.

In concluding this introductory chapter I must not lose the opportunity of expressing my opinion upon a matter regarding which there is great misapprehension, and, I regret to say, intentional misrepresentation. I refer to the subject of *pseudo-medical-dogmas,* such as are involved in the terms Allopathy, Hydropathy, Homœopathy, Kinesipathy, &c., and in such expressions as "a stimulating system," "a depleting system," "similia similibus curantur," "contraria contraribus curantur," and the like.

I disclaim them all, and I feel sure that in this statement I express the sentiment of the majority of thinking medical men. It is utterly unworthy of the professor of a science and art so great as medicine, to "pin himself" to such narrow dogmas and rules of thought and practice as are indicated by one and all of these expressions.

The practice of RATIONAL MEDICINE—having for its subject not only that most complex and wonderful fabric the animal organism, but that organism endowed with all those attributes which place man but "a little lower than the angels"—demands that there shall not be anything excluded from its service, and that every science and every art shall combine, at its bidding, to assuage the suffering and to save the life of Nature's highest earthly creature.

Every honest and intelligent practitioner of rational medicine knows, that there are remedies of unquestionable potency the action of which could never have been discovered by any such dogmas as "contraria contraribus curantur" or "similia similibus curantur." On the other hand, he knows that there are remedies the action of which may *appear* to be explained by one or other of these principles, but that the more intimately we become acquainted with the occult properties of medicines and the occult physiology of diseases, the more plainly do we see that these apparent explanations of the *modus operandi* of remedies are absurdly superficial and incorrect. He will not, then, refuse to benefit his patient by the use of the one remedy because he cannot explain its action, or of the other because it appears to act by similarity, or of a third because he thinks it acts by contrariety. Again, he knows that the same disease may assume such different phases, in different constitutions, at different times and in different places, that in one case it may require stimulation," in another "depletion," that at one period of the same case, "water treatment" may be advisable, at another "gymnastic," at another "mechanical," at another "climatic." And he claims these, and all other means beneficently placed within our reach which can protect health or benefit the sick, as the legitimate weapons in the armoury of rational medicine.

Every theory, every system, every dogma, must give place, at last, before the fact, *once unquestionably proved*, that such or such a remedy is best for such or such an occasion.

Therefore, in my opinion, all men who "pin their faith" on narrow dogmas, stamp themselves thereby as unfit for the practice of rational medicine.

CHAPTER II.

RULES FOR PROMOTING AND MAINTAINING VIGOROUS HEALTH IN ADULTS LIVING IN THE CLIMATE OF THE UNITED KINGDOM.

VENTILATION AND HEATING—GAS—HOUSE-DRAINAGE—CLOTHING AND PROTECTION FROM COLD—SLEEP—LONDON NOISE AND LONDON SLEEP—EXERCISE—POSTURE—BATHING—REGULATION OF THE BOWELS—REST AND CHANGE—SMOKING—MEALS—PROPER HOURS FOR MEALS.

⁂ These Rules will require to be modified by the medical man to suit special cases.

VENTILATION AND HEATING.

1. No sitting or sleeping room should be left long without a fire, and every room in which persons live, either by day or by night, should have some opening by which it communicates directly with the outer air; but this should be so arranged that no draught can fall upon the persons in the room.

2. If several rooms are occupied by turns during the twenty-four hours, the temperature of any one should not differ greatly from that of the rest.

3. No draught should blow upon a bed, and during sleep the whole body should have one covering at least of woollen material; for, while it is very important to keep the air of sleeping rooms fresh, it must be remembered that the body is more susceptible to chills during sleep than waking, and that changes in the temperature of the

outer air are especially apt to occur during the night, and are, therefore, in danger of producing chills before they are observed. (See Sleep.)

4. All arrangements for ventilation must be based upon the following facts:—

The rate of respiration in an average sized adult man is about 16 times per minute, and each such respiration vitiates about 1 cubic foot of normal atmospheric air; so that each adult man vitiates 960 cubic feet of air per hour, and consequently will require a supply of fresh air at that rate; or in round numbers 1000 cubic feet per hour.

This supply of fresh air can be provided by observing the following conditions:—

A current of air travelling at the rate of 36 linear inches per second is not perceptible as a draught, and at that rate of movement 1¼ cubic feet per minute or 75 per hour will be admitted by an aperture of 1 square inch sectional area, communicating directly with the outer air.

If, therfore, an apartment is provided with an aperture having a ratio of 1 square inch sectional area to each 75 feet of cubic capacity, the whole air of the apartment will be changed once per hour.

Supposing, then, that the cubic capacity of an apartment is in the proportion of 1000 feet to each person in it, the requisite supply of fresh air may be obtained, without draught, through an aperture of from 13 to 14 square inches sectional area to each 1000 feet of cubic capacity. But if the cubic capacity of the apartment is only in the proportion of 500 feet for each person in it, the air must be changed twice per hour in order to supply the requisite 1000 cubic feet of fresh air for each person.

When gas is burnt in an apartment the following facts must be borne in mind, in addition to the foregoing, for the purposes of ventilation:—

One cubic foot of ordinary London coal gas produces, in burning, 2-thirds of a cubic foot of carbonic acid, about the amount produced per hour by the respiration of one adult man,—and as an ordinary fish-tail gas-burner consumes about 3 cubic feet of gas per hour, it produces in that time as much carbonic acid as the respiration of three adults.

HOUSE-DRAINAGE.

The following valuable suggestions from an experienced architect I give in his own words.

Dear Dr. Dobell,

Knowing you to be greatly interested in such subjects, I have much satisfaction in forwarding the following practical remarks on "*House Drainage,*" together with some quotations from my own experience. Architects have opportunities where other persons have not of observing the action of drains; the evil consequences of their misconstruction; of their too frequent proximity to wells of drinking-water through additions and alterations of buildings, or otherwise; of soakage from cesspools; of evaporation of water from so-called "traps," &c. The opportunities referred to must therefore be my apology for venturing to address you on this subject, and you are quite at liberty to make use of the hints in this paper if they are likely to be of any service to the community.

I will commence, then, my observations by the somewhat startling and unpleasant enquiry which should be put to every house-holder, "Where are your drains and cesspools situated"? This is a question very closely linked with the preservation of life and health as you are aware; yet, on this enquiry being made, many tenants at once admit, that they do not know, that they have no idea; that they have been in the house many years and are only aware, perhaps, of one drain from the scullery-sink which drips into a ditch or pond, or public sewer; that their fathers added a wing to the house, containing a large dining and drawing-room, that there is at times a faint smell in these rooms, and the same unaccountable smell when a few friends visit them and when the shutters and curtains are drawn and good fires kept up; that the ladies are constantly troubled with headache, nausea, and lassitude; that the children are feverish at times, and death among them is not unknown! Could these house-holders only see the old brick barrel-drain and the fœtid cesspool, with its outlet cut off perhaps, inclosed in this wing, and the rats and insects working their holes in it a very little distance below the unventilated floors, they would get out of the house as quickly as their legs could carry them.

If premises which have been added to from time to time are pulled down, and especially where a faint smell has been noticed, you may be greatly astonished to find a barrel-drain crossing the house, cut through or broken in before reaching the cesspool or outlet, and a mass of decomposing matter extending a considerable distance under the floors of the rooms, in consequence of the drain being stopped. This occurred without the knowledge of an unfortunate house-holder who at times perceived a faint smell, but having got used to it disregarded it; having, however, lost a valuable life through the death of the mother of his young family, and having carried some of his children to her grave, he determined to pull down the rooms and build more airy ones, little thinking what he should discover. It was in this case the want of quality in the air more than of quantity that caused his losses.

My object in mentioning such cases is to rouse every householder to trace his drains to their outlets, let him see that they are clear and that they have no holes in them, and that they are laid to a good fall.

If premises are your own do not mind spending a few pounds. If necessary take out the barrel-drains and put in socket-pipes, truly and well laid on concrete, covered with concrete and jointed in cement, this will keep out rats and vermin and worms, and prevent noxious gases collecting under your floors.

If your floors are not ventilated, see if this cannot be done.

If you are about to purchase or hire a nice-looking newly-built house, do not for a moment suppose or take for granted that the drains are "all right," for in many new houses the drainage is only run out a little way from the walls and not led anywhere, but left for someone to complete after his family has been struck down, and who upon digging up his flower-beds and destroying the growth of his shrubs and everything else, in pursuit of the drains, finds that they are choked, and full of worms and black stuff, and go nowhere.

Whether you occupy an old or a new house and premises, caution is equally necessary. Look at all your surface-gratings, whether in your paths, your stable-yard, your conservatories, porches, lobbies, or wherever they may be, with great suspicion, especially in dry weather. People will sometimes say to themselves when walking about premises, "wherever does that smell come from?" little thinking that the water has evaporated from the traps. These surface drains should not be connected with sewer drains at all, but should have a separate service of pipes.

See where the rain-water descending pipes run to, look well at the joints of these vertical pipes. If you notice discoloration of the paint at the joints, you may know at once that they are connected with some cesspool or sewer-piping: *e. g.* a gentleman had low fever among his children, he could not assign any particular cause for it; one of the rain-water pipes, however, ran up the walls of of his house, within a couple of feet of the nursery windows, this pipe was painted a stone colour, the paint at and above the unstopped joints in this pipe was turned to a lead colour. The question as to where the water from that pipe went to was put to him, and answered by "nobody knows." On examining it was found (as might be conjectured) to go into an hermetically sealed cesspool. Every time rain fell and water went into this cesspool, the sewer gas found its way readily through the joints of this pipe, and as the nursery windows were kept open as much as possible after the rooms were warmed by the young life in them, there is very little doubt where the source or origin of the enteric fever was lurking.

As rain-water is valuable, have an underground tank to receive it, and an overflow pipe to it, separate from any sewer drain. Let the rain-water pass through a small filter-chamber, filled with shingle and charcoal, before entering the tank: this will take out flakes of soot and particles of leaves and vegetable matter, the water will then keep better.

If you wish to know what size to make such a tank ascertain how many square yards of ground your roofs cover. About one hundred and twenty-six gallons of rain-water fall on an average every year upon a square yard of ground: a cubic foot of water is equal to about 6¼ gallons, you can therefore easily judge what size to make your tank.

Touching upon soil pipes and cesspools in private houses where there are no public drains, I would say that too much care cannot be taken to provide for circulation of air in all pipes leading to and from cespools. Connect these pipes with a 4-inch tube and carry it up higher than your chimneys on some stout lofty tree, or on some building only a short distance from the house, if possible, and towards the south of the house, as such air works generally towards the sun; and away from the house, if let out south of it.

For your water-closets you will find a good D trap about the best check to any pressure of sewer-gas, as it will not be forced through a D trap so easily as through some of the modern shallow traps and syphons; but if you happen to have valve-closets, or light traps, a lead pipe can in most cases be put into the leaden bend and carried above the roof; then you will have an essential safeguard, *e. g.*, it will be evident to all that when water goes down a soil-pipe a certain quantity of air must be displaced, this air will rush out into the closet unless ample provision is made for its escape elsewhere; and as the act of a person pulling up a closet handle is first, to stoop, which causes him to emit his breath, and then to raise himself which causes him to inspire, it will be readily noticed that he is sure to take in his breath at the moment when the water runs down the soil-pipe and the pent-up sewer gas rushes out close to his lungs. Keep the closet seat-flap down, cut holes in the flap to admit of the handle being raised when the flap is closed; it will, however, be far better to ventilate your soil-pipes and drains. Water-closets should be flushed with a large pail-full of water now and then, because the small quantity of water coming in through the supply-pipe into the pan is insufficient for this purpose, especially when the handle is held up a very short time. Jenning's and Underhay's pans are better supplied with water than many, but even with these arrangements no sufficient flush takes place to well push on the excreta. When these accumulate, ammoniacal and other matters are formed and danger springs up, but there is not the same danger (if any) from fresh sewage. Do not allow slops to be emptied down your water-closets because some may be spilt and get between the seat and the pan, and gradually saturate the woodwork beneath, causing decay and unwholesome faint smells. Have a pad of dry hair-felt sewn in an oilskin cover placed between the top of the pan and the wooden seat if there is any vacant space there; this will stop draught and the splash referred to.

Lime-white with hot lime the floor and inside of the seat-enclosure annually; this can be readily done by taking off the top or seat of the enclosure.

The effectual ventilation of water-closets situated as they often are, is by no means an easy matter. If you open the window, the warm house will quickly receive the smell you intended to go outside, and you will soon perceive that the air will not obey your commands. Have a space (however small) between the inner and outer doors of the water-closet; if this space is too confined for a window get external air into it by tubes, this stratum of air will materially assist you, because it tends to balance and check the progress of the air in the water-closet beyond; but the better method is to lead a tube from the ceiling of the water-closet into the nearest chimney flue where there is smoke ascending, or where there is sufficient warmth to make it act as you wish; your water-closet will then soon be cleared of all disagreables, a valve however, should be balanced in this tube to prevent any sudden down draft.

Some provision should be made for disposing of slops entirely away from the water-closet. People are little aware what odd things are put down water-closets. If plumbers told people the queer things they find in water-closet pipes they would not be believed. Water-closets should be strictly guarded, and domestic servants cautioned against misusing them. The same oversight should be given to traps in sinks and elsewhere; these traps are often lifted off and not put on again, resulting in much damage to the health of the servants and all the inmates of the house. Let all pipes from sinks, butler's pantries, baths, &c. discharge themselves free to the air before entering sewer drains: this plan can generally be carried out without difficulty or dissight.

Have all junctions of water-closet pipes with the drains examined now and then, as the stopping often shrinks and the lead decays, especially if the stopping is made of Portland cement. The seating or fixing of the pan on to the soil-pipe should also be examined periodically so as to stop any leakage of sewer gas.

All cisterns should be cleaned out once a year, and any deposit removed. If you have a "waste-pipe" in your cistern branched into the soil-pipe, which is two frequently the case, look well to it, for unless your drains are sufficiently ventilated, the sewer gas will be forced through the waste-pipe and may be absorbed by the water in your cistern. If you have a painted lid to your cistern see if any discolouration has taken place; if you find such to be the case you may be sure that sewer gas has escaped into your cistern.

If you have drains from your basements and cellars be particularly careful to see that the traps are efficient and kept well supplied with water; the great importance of having this seen to is self-evident. Where do you suppose the supply of air to your sitting-rooms is frequently drawn from? if they happen to be over rooms or cellers with plastered ceilings air will percolate from them into your sitting-rooms. You can prove this by blowing a cloud of tobacco-smoke below; or you may find it out accidentally through something being spilt, such as paraffin oil for instance. Have your cellars frequently limewhited and the floors cleaned.

I will only slightly touch upon wells and drinking-water because it is impossible to exhaust such an important and interesting subject in a paper like this, but I do wish to observe, that every householder should know exactly where his well is situated, if he has one.

People are little aware how soon drinking water is spoilt by a small leakage of surface-water, or drain-water into it, *e.g.*, an additional drain is thought desirable, an ordinary bricklayer is sent for, who puts it in for you, not knowing your well is in close proximity to it, or if he knows its situation you are not informed of it; the consequence may be and often is most disastrous. Cases such as this are common through persons hiring houses (on a lease for instance) and who like to see the premises dry quickly after rain; they do not know and do not trouble themselves to ascertain where their wells are; but have extra drains put in as alluded to without thought: their drinking water is spoilt; the sequel is too certain and the evil often only found out when too late.

To effectually deal with the sewage of large towns so as to remove, and actually to convey away noxious matters from our very midst without the use of the present water system is a great difficulty, and the prospect of any radical change of the present system in London, for instance, seems an impossibility, on account of the gigantic network of sewers already provided and in use.

Nevertheless, I will proceed to mention a few grave objections with the hope of an amelioration of some of them, by better attention to details in respect to the more efficient ventilation of sewers and the prevention of the ingress of evil-smelling, if not of poisonous gases into our houses. The worst form of sewer-gas is generally formed and found in the side drains, or branches which are led up to our houses, and the contents of these are all but stagnant when the main sewers are filling. Remove, therefore, where possible, all inlets into the drains leading to the sewers from the interior of your houses. But it may be said that in the majority of cases this cannot be done without destroying the drainage altogether; the answer is, such cases are, comparatively speaking, few. Take drains from cellars for instance, how seldom they are of real service compared with the great danger of their presence. Cellars can be cleaned down without necessitating a trap and drain into the sewer. Deal with the cleansing of a cellar-floor the same as is done with a boarded floor, by wiping up the water and drying the floor as well as may be.

Asphalte is very good for cellar floors, and very cleanly. Nasty traps in your cellars and basement, containing in themselves a quantity of stagnant dirty water communicating with the sewer, the gas in which can easily be forced into your house, is a grave form of evil; to cure this source of disease, simply dispense with the traps and drains and wipe your floors clean. By some thought and contrivance it will be found that very many connections with the sewers can be avoided.

Waste pipes, again, in cisterns connected with the soil-pipe and sewer should be dispensed with, and means to prevent occasional overflows of water when the badly fitting common ball-taps stick, should be provided for in another direction. Waste-pipes in cisterns connected with sewer drains are outspoken examples of the stupidity, which, with an utter disregard to sanitary laws, persists in such suicidal arrangements. Surely there is great inconsistency in raising alarms about the impurity of London water, whilst at the same time it is not unfrequently contaminated with a poison through the waste pipes in cisterns which no filter can remove. Where connection with the sewers is actually necessary (as in water-closets) ventilate the soil-pipe by a vertical continuation of it to such a height as circumstances will permit.

Water-closets should not be in the midst of our houses at all, but projected outwards with a lobby or anteroom, as before alluded to; but it is quite surprising how few junctions with the sewer drains in houses are absolutely necessary. Every internal junction dispensed with is a step in the right direction; get all connections, where possible, outside your houses, because sewer-gas forced out into the open air is soon robbed of its noxious powers, but its escape into the interior of your house is as bad as a murderer entering it, and a very sly insidious felon is sewer-gas.

The dry earth system is most excellent and effective, but the cost of bringing round dry earth and removing that used in populous places would be heavy and the intrusion and inconvenience apparently great; time however will show whether this system cannot be developed without such drawbacks. Moule's dry-earth system is most in use. Goux's absorbent closet system is equally effective, having been tried and adopted for the North camp at Aldershot, and even in so large a town as Halifax.

Dry earth commodes, also, for sick chambers are very useful.

As compared with the water-closet system, the earth closet has several advantages. It is cheaper in its original cost, it requires less repair: it is not injured by frost, it is not liable to damage through hard substances being thrown into it, it greatly diminishes the quantity of water required by each household. My own experience is in favour of the earth system, if carried out under proper authorities. It is deserving of every consideration, but its merits at present are not sufficiently understood by the public, to interfere much with the poisoned water system. Formidable sums of money are being spent in draining towns *so as to lay on sewer-gas by means of pipes to our very bedroom doors.* Is this right? Will not the water system be superseded?

Cleanliness after all is the great natural disinfectant; look well, therefore, to all sources of water-supply, impure water-butts, sinks, and particularly dust-bins; remove frequently all possible sources of nuisance and accumulations of impurities; also, last but not least, get rid of any damp mouldy paper-hangings and the festering paste behind them, if you have any such sources of fever on your premises.

There is an important lesson to be learnt by all of us. Every householder should make himself acquainted with so much of sanitary science as will enable him to preserve the health of his family. To secure health, sanitary laws must be understood and carried out. A family cut down by preventable sickness cannot be considered a fortunate one, and it is just as necessary to learn something of sanitary laws to provide against this, as it is to provide the common necessaries of life.

I am, dear Sir,
Yours truly,
G. E. PRITCHETT, F.S.A., F.R.I.B.A.

40 Lombard Street, E.C., and
Bishop Stortford, Herts.
January, 1872.

CLOTHING.

5. In winter, the body and limbs, from the root of the neck to the toes and elbows, should be covered, next the skin, with some woollen material, such as lamb's wool or flannel.

6. In summer, the material may be lighter, as merino, and need not cover the limbs.

7. The same woollen dress should not be worn both night and day, but should be changed for a woollen sleeping *vest* of the same material as that worn during the day. (See Sleep.)

8. Having provided that the skin is so covered that it is protected against sudden changes of temperature, all other clothing should be limited to that which is sufficient to preserve a comfortable feeling of warmth under the different changes of the season and of the weather.

9. Over-clothing, *i.e.*, such as keeps the body perspiring while at rest or produces perspiration under very slight exertion, should be avoided, especially over-clothing of any one part of the body by which it is kept hotter than the other parts.

10. It is of the greatest importance to keep the feet dry and as warm as the rest of the body. If the weather is damp, this can only be done by wearing goloshes when out of doors. (See Bathing).

This subject may be further elucidated by the following extract from the Author's LECTURES ON WINTER COUGH, CATARRH, BRONCHITIS, EMPHYSEMA, ASTHMA, *delivered at the Royal Hospital for Diseases of the Chest in* 1865.

Fresh colds were the only causes which brought on or aggravated the cough in 72 per cent of the cases, and the most frequent and potent causes of these fresh colds, as stated by the patients themselves, were:—

1. Sudden changes of temperature in 21 per cent.
2. Fogs and damp air in 19 per cent.
3. Draughts of cold air in 16 per cent.
4. Cold winds in 10 per cent.
5. Getting wet in 14 per cent.
6. Wet feet in 17 per cent. And we find the same list of causes of fresh colds recurring as the potent provokers of *short breathing.* This important list is no less striking for the power for evil which it is shown to possess, than for the remarkable simplicity of the evil powers themselves.

If, then, these unfortunate sufferers from *Winter Cough* could have been protected from sudden changes of temperature, fogs, mists, cold winds, draughts, wet feet, and wet coats and dresses, 72 per cent. would have kept free from their coughs. It would seem strange if we could not find means of protection against such common-place influences. In truth, there is no deficiency of means of protection against them, and it is because of the very common-place character of these means of protection and of the influences themselves that both are so much neglected and under-valued..

But 72 per cent of the cases of Winter Cough which I have analysed might probably have been prevented by attention to these common-place things. Let us then give a few minutes to their consideration.

1. Sudden changes of temperature. This is the most difficult to avoid of any on the list. The occupations and amusements of all classes involve such changes, and we cannot stop these occupations and amusements, even were it desirable to do so. The workshop, the counting house, the committee-room, the opera-house, the ball-room, must

be warm when the outer air is cold, and changes from one to the other cannot be avoided. But very much can be done to prevent the body from feeling these changes. The first and most important is the complete envelopment of the body and limbs in wool next the skin, thus interposing a bad conductor of heat between the surface of the body and the outer air. It is surprising that, even at the present day, this simple and common-sense protection is neglected by so large a number of persons both of the educated and of the uneducated classes. It is not sufficient for the purpose in view that a little body-vest should be worn just big enough to cover the thorax and abdomen, leaving the extremities unprotected. It should be insisted on by medical men that the arms and legs require to be protected from sudden transitions of temperature as well as the trunk.

In fashionable life the greatest practical difficulty we have to encounter is the question of exposing the necks and shoulders of ladies in evening dress. It is useless to order body-clothing of wool to the throat, and to expect that ladies will give up a fashion which has been followed and thought charming in all countries and all ages. The difficulty is, however, to be got over pretty well. Every lady in evening dress should carry with her, as invariably as she does her pocket handkerchief, a Shetland shawl or a mantilla of wool or fur, of a size and shape to cover all those parts not protected by woollen underclothing, and it should only be removed while actually within warm rooms and should be kept at hand to be replaced on passing through passages, or if the rooms become cold, or if sitting in draughts.

The main source of protection, then, against sudden changes of temperature to the surface of the body, is to be found in a complete covering of wool next the skin. But besides this, much greater attention, than is common, should be paid to putting on and taking off complete and efficient over-clothing when going from hot to cold and from cold to hot temperatures. This is particularly neglected by the working classes and by girls and boys at school.

What I have said with regard to sudden changes of temperature will apply equally to two other causes of fresh colds on our list, viz., draughts of cold air, and cold winds. Both are to be deprived of their sting by proper clothing of the skin and mucous orifices—of the latter I shall speak again.

Getting wet, and wet feet occupy a very serious place in our list, and there is no doubt that *damp and cold* applied to the general surface is a most efficient means of producing chill and vital depression, with congestion of the internal organs. It is necessary that cold be combined with moisture to produce this effect.

Even if all the clothes on the body are wet, no harm will come so long as they are kept warm, and this suggests the very great value, to all persons liable to exposure to wet, of light waterproof over-alls. They may either be put on to keep the underclothing dry, or, if the underclothing has become wet, either by weather or by perspiration, they may be put on to prevent too rapid evaporation and consequent reduction of temperature, especially when the person is about to remain still after getting warm with exercise. In this variable climate, therefore, school girls, governesses, shop and factory girls, and all women whose occupations call upon them to brave the weather, ought to carry with them complete waterproof mantles made as light as possible, but extending from the neck to the ankles, which can be put on or not as required; and boys and men similarly exposed should carry water-proof over-alls.

But if wet and cold to the surface of the body is a fruitful source of catarrh, wet feet—which means wet and cold feet—is a still more prolific source. There is no external influence which so surely produces congestion of the naso-pulmonary mucousmembrane, as wet and cold to the soles of the feet. There is nothing so universally neglected, and yet there is nothing more easy to avoid. Warm socks, horsehair soles, goloshes, provide efficient protection against wet and cold feet. It does not seem to be half understood that, although a shoe or boot may not be wet through, if the sole is damp it will, by conduction and evaporation, most effectually carry away the heat from the sole of the foot, and, therefore, ought never to be worn after exercise is over.

We have still one item left on our list—viz., Fogs and Damp air, which were the things most inclined to make the breath short in 24 per cent. of the cases, and the most potent causes of fresh colds in 19 per cent. I have particularly remarked, that although the smoke and other irritating matters constituting fog are unquestionably very injurious, it is the moisture and cold of the fog which are the qualities most potent for mischief to the naso-pulmonary tract. There is but one means of depriving a fog or mist of its injurious properties, and that is a respirator; and the same may be said of the changes of temperature of which I spoke just now; a respirator is the only means of protecting the respiratory passages from the effects of transitions of temperature.

Although it is quite proper to cover the neck and throat lightly, I am decidedly of opinion that *warm* wrappers round the neck are objectionable; they produce congestion of the nasal and faucial mucous membrane and thus dispose to the very complaints they are supposed to prevent.

I am glad to find the use of respirators, which I have so long advocated, recently demonstrated in one of Professor Tyndall's beautiful lectures. (See appendix.)

SLEEP.

11. During ordinary health, the hours spent in actual sleep should not exceed eight; and if the sleep is sound, continuous and refreshing, six will be sufficient for many persons. (See Rest and Change). It is of great importance, especially with the young and the weak, to maintain the due proportion between the number of waking and sleeping hours. If, therefore, it is necessary, as in going to places of amusement, to sit up unusually late, the waking hours, thus spent, should be compensated by a similar number of sleeping hours, taken in the preceding day; so that over fatigue may be prevented. For example, if the usual hour for rising is 8 and for bed 11 and it is proposed to stay up till 3, the hour for rising should be changed to 12; or 4 hours rest should be taken at some other time during the day.

12. During sleep, it is equally important to keep the body pleasantly warm, and to avoid keeping it overheated; and, as serious changes in the weather may happen in the night, and the lowest temperature in the twenty-four hours naturally occurs between 2 o'clock and 6 o'clock a.m., the ventilation and clothing must be prepared for these contingencies. (See Ventilation, and Clothing).

13. If sleep is taken after meals, it should not exceed half an hour in duration; it should be taken sitting back in an easy chair, with the head supported behind; not

lying down, and not sitting with the chin resting on the breast; the feet should be kept warm, and the dress loose round the neck and waist.

14. Every precaution should be taken to secure quiet sleeping-rooms. (See appendix "On London noise and London sleep").

EXERCISE.

15. During ordinary health, some part of every day ought to be spent out of doors; and in ill-health it is of great importance not to discontinue the observance of this rule without good reason; for, although *in certain states of disease it may be very important to remain in-doors,* it must not be forgotten that proper clothing, goloshes, respirators, and umbrellas, may make it not only safe but advantageous to go out of doors for exercise, when, without them, it would be very injurious. (See Posture).

16. Out-of-door exercise should be as active as the strength will allow, and should always be continued up to the point of slight—but not over—fatigue. This will be the best measure of the proper amount for both the weak and the strong.

17. Unless the air is pure, and the person strong, exercise before breakfast is more likely to do harm than good; a tumbler of milk and a biscuit, however, will be a sufficient meal to take before the walk or ride—a more substantial breakfast being taken afterwards. (See Meals).

18. Especial care is needed not to expose the body to chills when heated by exercise; and cold drinks should not be taken at that time, unless the exercise is about to

be continued immediately; and even then the quantity of cold drink taken at once should be very small. (See Meals).

In his work "ON PHYSICAL EDUCATION," *referred to at* p. 9, *Mr. Maclaren makes the following excellent remarks.*

"Such in brief is Exercise, such the ends which it accomplishes, and such the manner of their accomplishment; viz. the *destruction* of the tissues, the hastening of the decay and death of every part coming within its influence; but also the speedy removal of all waste, the hastening forward of fresh material for its replacement; and in doing this it attains three distinct but co-relative results.

"1. It increases the size and power of the voluntary muscles employed.

"2. It increases the functional capacity of the involuntary muscles employed.

"3. It promotes the health and strength of the whole body, by increasing respiration and quickening circulation." . . . .

"It is *health* rather than strength that is the great requirement of modern men at modern occupations; it is not the power to travel great distances, carry great burdens, lift great weights, or overcome great material obstructions; it is simply that condition of body and that amount of vital capacity, which will enable each man in his place to pursue his calling, and work on in his working life, with the greatest amount of comfort to himself and usefulness to his fellow men......Let it not be inferred from this that I consider health and strength as in any manner opposed to each other, on the contrary, they are most intimately allied and are usually, by the same means and by the same manner obtained, very closely are they connected but they are not the same, and a man may possess either without the other." p. 24......A most important principle in Exercise, and one which should ever be borne in mind, is, that it should be regulated by individual fitness; for the exercise that scarcely amounts to exertion in one person will be injurious and dangerous to another, and not only is this inequality observable among different individuals, but, the same individual may have parts of his body possessing special power or presenting special weakness. A man may have limbs capable of transporting him at the rate of four miles an hour throughout the day, and for many days in succession, but with heart or lungs all unequal to the effort. Or he may have an organization so frail and a temperament so susceptible to stimulation or excitement, that the one is an abiding danger to the other." p. 55.

POSTURE.

19. It is of great importance to acquire a habit of drawing the breath deeply and slowly, so as to expand the lungs freely during ordinary breathing. This requires that the head and shoulders be thrown well back in walking, sitting, and standing, and that no clothing be worn tight round the ribs. Those engaged in sedentary or stooping occupations should especially attend to this advice.

20. Those whose occupation obliges them to maintain the erect posture for a number of hours each day, should take every opportunity of lying flat down, even if only for

a few minutes at a time. They should also bear in mind that standing will not take the place of walking exercise. (See Exercise).

21. All persons whose pursuits require the long continuance or frequent assumption of any particular position or movement of the body or limbs, should take every opportunity of changing it for an opposite position or movement. (See Rest and Change, and Sleep).*

BATHING.

22. Warm baths, Turkish baths, vapour baths, shower baths, and cold plunges, should only be used under special medical orders.

23. During ordinary health, the skin of the body and limbs should be smartly rubbed, once in twenty-four hours, first with a rough towel wet with cold water, and then with a dry one till in a glow. The bather should stand on a dry rug while using this *"cold friction bath,"* and it should not last more than one or two minutes, including both the wet and the dry rub. Salt may be advantageously added to the water; and the bath may be used either on rising or going to bed, according to the feelings and convenience of each individual. When water cannot be borne cold, it must not be used tepid, but very hot. —The momentary application of very hot water to the skin, immediately followed by a brisk friction, will produce a direct-action glow nearly approaching the re-action glow following the application of cold.

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* For "Gymnastics" see Mr. Maclaren's "System of Physical Education," already quoted. For effects of unhealthy posture, see Mr. Heather Bigg's "Orthopraxy."

24. If the weather is very cold or the person delicate and chilly, the upper half of the body should be uncovered and rubbed first, and then a woollen vest should be put on and the lower half uncovered and rubbed.

25. It is well to accustom the feet to being washed in cold water, but it must be done cautiously at first, and they should never be kept in the water more than a few seconds.

26. It is obvious, that there are times when cold bathing of all kinds must be temporarily discontinued.

REGULATION OF THE BOWELS.

27. As a general rule, the bowels ought to act, at some stated time, once in the twenty-four hours; and it is best to accustom them to act in the morning, after breakfast.

28. If they do not act spontaneously, they should be assisted by some wholesome article of diet which is found to affect them; or by some harmless aperient medicine, which must be prescribed by a medical man, to suit the particular case; for the best aperient for one person may be the worst for another.

29. Provided that an aperient medicine is suited to the case, contains no drug injurious to the general health, and is not taken oftener than every second night, there is no harm in taking it at bed-time, whenever the bowels have not acted satisfactorily during the day.

REST AND CHANGE.

30. Active life is essential to the health of body and mind; but both require periods of rest, in addition to the regular hours of sleep. It is much better, therefore, to work vigorously for a time and then to rest, than to keep up a monotonous round of lifeless drudgery. (See Sleep; and Exercise).

31. The "current of the thoughts" is to the mind what posture is to the body; and both require change to prevent weariness and deformity. (See Posture).

32. Rest of body or mind may be obtained either by abstaining from all bodily or mental exercise, or by change of occupation, and as the one gives entire rest and the other only partial rest, it is best to adopt each of these measures at different times.

33. It must be remembered, that, as the mind acts by means of the brain, which is a part of the body, it cannot act healthfully while the body is suffering under disease or exhaustion. The "*gait*" of the mind is affected by the condition of the brain; as much as the "*gait*" of the body is affected by the condition of the limbs.

SMOKING.

A certain number of persons have a peculiar susceptibility to the poisonous influence of Tobacco, and they should never touch it. But for the majority of adults a moderate amount of smoking does not appear to have any deleterious influence, and in many it acts as a useful antidote to brain-worry.

MEALS.

34. Counting from the time of beginning one meal to that of beginning the next, food should be taken at regular intervals of from four to five hours; except the interval between dinner and a very slight tea, which may be reduced to two or three hours. In weakly persons, and when the appetite will allow only a very small meal to be taken at one time, the intervals between all the meals may be reduced to from three to four hours. In illness, the interval must be ordered day by day by the medical man.

35. The chief meal of the day—the full-meal—by whatever name it is called, should be taken at whatever hour active occupation, both bodily and mental, can be suspended for about two hours; provided always that not less than two hours elapse between the conclusion of the full meal and bedtime.

36. Breakfast should be the second best meal of the day, and should be taken leisurely immediately after rising in the morning. (See Exercise).

37. The other meals should be taken punctually at the fixed hours, but should be only light refreshments, and small in bulk.

38. No food should be taken in the intervals between the regular meals.

39. As a general rule, pure water may be taken at any time, if indicated by thirst, so that the body is not heated by exercise, and the quantity drunk at once does not exceed a quarter of a pint. (See Exercise).

40. Spirituous liquors should not be taken the first thing in the morning or the last thing at night, without medical orders, they should not be taken when the stomach is empty, and they should not be drunk stronger

than in the proportion of one ounce avoirdupois of absolute alcohol in about ten fluid ounces of liquid.

One of the principal sources of mischief in the use of alcoholic liquors is the practice of taking them to quench thirst in the place of unfermented drinks. *The sense of thirst is a call from the organism for water, not for alcohol.* Let the alcohol be taken as food, as medicine, or as a luxury, but not to quench thirst in the place of those unfermented liquors which are essential to health as diluents and solvents. (See Alcohol Table, and Remarks on Alcohol, Chapters I. and V. also Appendix).

41. ALCOHOL FASTS.—Those who habitually take alcohol daily, should abstain from it entirely for a few days twice or thrice a year.

*The importance of "*PROPER HOURS FOR MEALS,*" is more fully explained in the following extracts from a letter by the Author, addressed to Employers, "to advance the first step towards improving the national dining-hours of the commercial and working classes," printed for private circulation in* 1852.

GENTLEMEN,—I address you as individuals who have a certain influence over the habits of a large portion of the community. Many past events testify so much anxiety on your part to increase the domestic comfort and social happiness of your dependants, that I feel desirous to assist you in your praiseworthy object, by calling your attention to a most fruitful source of discomfort, pain, and even misery, peculiarly rife among the objects of your solicitude; I beg, therefore, to point out to you, that it is in your power either to ameliorate these evils, or to increase them, according, as you frame some of your regulations.

That animal life cannot go on in even passable health and comfort without sufficient food and effectual digestion, is a fact perfectly familiar to all; yet, unhappily, among those who live an in-door life, effectual digestion is scarcely ever known. They constitute the bulk of that enormous number of persons who suffer from what is popularly known as "indigestion."

Now, there can be no question that they are pre-disposed to this class of diseases by many circumstances, quite inseparable from their occupations. But that makes it the more desirable to avoid all those causes of disease which are not necessary to their pursuits.

I must request you to remember that I am not speaking of any *particular form* of indigestion, but in a general and broad sense, of all those various maladies classed under the popular term.

The choice of the hours at which clerks, shopmen, mechanics, labourers, and other business-servants of both sexes take their meals, depends almost entirely upon the decision of their superiors.

If these hours are not well chosen, indigestion, in some form, is the certain consequence sooner or later. And you will see, from the few plain facts which I shall lay before you, that the notions which have long prevailed as to the proper hours for taking food, and consequently the regulations of nearly all business establishments, in this respect, are inconsistent with the conditions which physiology teaches us to be essential to healthy digestion, with the requirements of the various occupations by which servants gain their livelihood, and with the conventional arrangements of society in the present day.

I shall hope, by avoiding all technicalities and minute physiological details, and by employing the plainest popular terms, to make my meaning perfectly intelligible to the unprofessional, to whom, in this instance, it is necessary to address my remarks; and I now ask your particular attention to the following statement of the conditions necessary to healthy digestion.

1. Food of appropriate quality and bulk.

2. In the case of a *full meal*,—rest of body and tranquility of mind for a short time previous to taking food, and for at least an hour afterwards. In the case of a *light meal*,—gentle exercise, and moderate mental activity may be allowed with impunity.

3. Effectual mastication, by which the alimentary matter is completely disintegrated and saturated with saliva, and the meal taken slowly.

4. A sufficient interval between any two meals, to allow the first to have been digested and removed from the stomach, long enough for the digestive functions to regain their full vigour, before the second is introduced. The period which should intorvene will depend upon the rapidity of digestion, which may vary according to the quantity eaten, the state of the health, the nature and amount of the previous exercise, the condition of the mind, and many other circumstances.

5. Caution that the stomach is not left empty long enough for the system to become exhausted, and the digestive powers thereby weakened.

6. Strict adherence to the same hours for taking food, that the stomach may acquire a habit of preparing for its reception.

7. An interval between the last meal and bed time, sufficient to allow the work of digestion to be concluded before lying down to sleep.

Many other conditions might be mentioned, but as the few main points already stated are enough for our present purpose, I shall confine myself to them.

The circumstances under which the majority of those persons are placed, whose health we are principally considering, must now be reviewed, in order to compare them with the conditions essential to healthy digestion, and to draw the necessary conclusions as to the PROPER HOURS FOR MEALS.

From the factory artisan up to the banker's or merchant's clerk, several important circumstances are common to all.

1. The day is devoted to labour either of the body or of the mind, or of both.

2. Business must be continued unremittingly up to the moment of leaving for meals, and resumed immediately on returning from them.

3. The time which can be spared for meals during business hours, must necessarily be very limited.

4. Some portion of this short time must be occupied in repairing to, and returning from the refreshment place.

In many instances, especially in retail trades, the nature of the business renders it impossible to keep to fixed times for those meals taken during working hours.

The fact of taking time for meals out of the middle of the day, necessarily makes it later in the evening before the business can be finished; and this not only to the extent of the time during which work is actually stopped, for we all know how much the progress of business is interrupted by the simple acts of discontinuing and recommencing it, more especially when books and calculations are concerned. The effects of these combined circumstances may be viewed daily by visiting the public dining rooms attended by clerks, the lodgings of labourers at their dinner hour, and the offices and factories before and after meal-time—dinner-time more particularly, and dinner being the principal meal in the day—the *full meal*—it is of it that I shall chiefly speak.

Twelve, one and two o'clock seem to be the national dining hours for the working classes, and sixty minutes the maximum time allowed from business for this chief meal. The hour having arrived, books or tools are hastily laid aside, and the dining place is reached by a sharp walk, which adds to the bodily fatigue of the labourer, and is not long enough or sufficiently leisurely to rest the brain of the accountant. The dinner must be despatched hurriedly, or there will not be time for the artizan to smoke his pipe, or for the clerk to glance at *The Times*; or perhaps the reading and eating are carried on at once. Mastication is carelessly performed, the mind is kept occupied, and the stomach rapidly loaded with food before it has had time to make ready for it; and, in some cases a larger quantity is taken than the stomach has power to dispose of, simply because it is introduced too expeditiously for the system to become acquainted, as it were, that the supply of its wants is being effected. The meal finished, and the paper glanced at, or the pipe smoked, the sharp walk must be repeated, now with a full stomach, and business resumed before digestion has had time even to commence: and at this period, when the organic energies ought to be all concentrated about the stomach, they are at once summoned to the brain or to the muscular system. Consequently, the meal remains imperfectly digested, or not digested at all, lingers in the stomach beyond its proper time, and is finally expelled in an unnatural condition, unfitted to undergo the important changes necessary before it can be appropriated for healthy nutrition. In all probability the next meal is introduced before the former one has entirely left the stomach, and thus the mischief is increased. Comparing the circumstances, here briefly enumerated, with those essential to healthy digestion, laid down before, the antagonism, so evident between them, plainly shows that "Dyspepsia," or difficult digestion, is only the natural consequence of so persistent a disregard of the laws of health.

I am aware that different businesses do, from their nature, present various obstacles in the way of carrying out such sanitary measures as are most desirable, and that one set of rules will not always be practicable in two establishments. Therefore, I should advise that the few principal conditions of healthy digestion before mentioned be carefully borne in mind; and that in each establishment the hours for meals be so selected, that these conditions and the calls of business may be arranged in unison with each other.

For a considerable period of time, during which my attention has been more particularly directed to this subject, I have made extensive inquiries on points connected with it, among employers and their servants, and have also had sufficient opportunities of enforcing the better regulation of meals upon both classes, with effects so decidedly beneficial, that I can with confidence impress the importance of the alterations I propose, and I am convinced of their general practicability. After this experience and a mature consideration of the subject scientifically, I beg leave to call attention to those regulations, which appear to me to afford the nearest approach to the healthy standard that can be practicably arranged to meet the necessary obligations of business establishments in general.*

Let me assume that a substantial breakfast has been taken soon after rising, and a space of time allowed to elapse between the meal and the commencement of active business; (in those cases where the hour for business is very early, the breakfast should be divided, the fast being broken by a light fluid meal, and a second light meal taken some hours after). But to return to the better plan. Breakfast having been taken, and the day's employment commenced, the arrangements are now under the direction of the employer. *From this moment until labour, whether mental or bodily, has ceased, no* FULL-*meal should be allowed.* This is to be considered the FIRST GOLDEN RULE. The SECOND is not less important—that some *light refection should be taken punctually every four or five hours.* By adhering to the first rule, the system will never be charged with the task of active digestion at times when it is amply engaged in other functions; the digestive organs will not be injured by being called upon to undertake what they cannot properly perform; while the servant will not suffer from that oppressive languor and inertia, so unavoidable after a full meal, and will be so much the better fitted for his duties. By the second rule the system is maintained in a state of energy, the light refreshment, being easily digested during bodily or mental activity, supports the strength much more than a full but ill-digested and unassimilated meal can possibly do, and leaves the stomach itself unwearied, in a state of healthy vigour when the hour of relaxation from business arrives. Even in weak persons, a light meal will almost invariably have quitted the stomach in four or at most five hours, and in the strong considerably sooner than this; at intervals of four or five hours, therefore, according to the strength of the individual and the rapidity of his digestion, the stomach will be preparing for fresh work, and will call for it by the return of appetite, which must not on any account be disregarded. And in this place I must again impress upon you THE SERIOUS IMPORTANCE TO HEALTH,

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* This was written twenty years ago and subsequent experience has amply proved the value of the rules laid down.

OF NOT NEGLECTING THESE OCCASIONAL REFRESHMENTS DURING BUSINESS.

The day's labour over, the objections to taking a full meal are at an end, provided the second golden rule has been observed; and the amount of refreshment, necessary to repair the wear and tear of the day's exertions, may now be taken with decided advantage. I must here remind both employers and employed, that rest of mind and of body are necessary for a short time *before* taking a meal.* To those who have been mentally occupied with sedentary business, a short leisurely walk will be a very proper prelude to dinner; but to those whose physical powers have been taxed during the day, there should be a short period of perfect rest before commencing the chief meal. It is a habit too common among commercial men to return home, impatient for their dinners, and to commence eating immediately, while in a fatigued condition. I have, in many instances, induced such persons to lie down for a quarter of an hour before beginning their meal; and have seen so much benefit arise from this practice, that I can confidently recommend it to all who are actively engaged during the day. When the dinner is finished, one hour at least should be devoted to mental and physical tranquility—some leisurely amusement being *preferable to sleep*. (See Sleep.) When the meal has not exceeded the bounds of moderation, a sufficient quantity of gastric fluid for the digestion of the whole will generally be secreted within this period of rest; after which, the same quantity of blood and nervous energy being no longer required by the stomach, some more active employment of the mind or body may be indulged in, and all will go on well.

The full meal of the day, then—the dinner—should, under ordinary circumstances, be taken between the hours of five and seven p.m., which will allow time for it to be entirely disposed of before the hour of sleep arrives; and as the whole night passes without refreshment, a light refection such as our national "tea," is very desirable a few hours before bed-time. These arrangements will be found perfectly consistent with the essential conditions of healthy digestion; and, with a little contrivance and modification of hours in particular instances, are practicable in the majority of large establishments. And here let the friends of "early closing" observe, that by doing away with the injurious mid-day dinner, there will be so much saving of time in the best part of the day, and consequently a better opportunity of concluding business earlier in the evening.

It remains for me briefly to point out some of the inconsistencies of the system now most popular among dyspeptics and those employed in business. The dinner being taken at one or two o'clock must necessarily be a hurried one; it is impossible in the middle of business to allow time for rest, before or after the meal, to any serviceable extent: the evil consequences of this, in a large number of instances, have been already referred to. The "tea" being taken between five and seven o'clock, can only be a light meal, for the stomach does not require more so soon after dinner, therefore there is but one alternative, to leave the system without substantial nourishment from two o'clock p.m. until breakfast next day, or to take another meal just before bed-time: of the two the latter would be the better, if the supper could be limited to a very moderate refection; but after waiting from an early dinner until nine or ten o'clock in the evening, a person in health has too good an appetite to be contented with this; therefore the stomach is loaded at a time when it cannot empty itself properly before the hour of sleep; the disadvantages of which are too familiar to need repeating here. Any one, therefore, who is anxious to regulate his diet according to the *popular ideas of what is healthy,* finds himself in this dilemma. He believes it to be an essential point that he should dine at an early hour. He knows that rest before meals, eating them slowly, and rest after them, are all necessary to proper digestion. He also knows perfectly well that, in the middle of the day, his business will not allow him either the rest or the leisurely dinner. Supper he is convinced is a most unwholesome meal, yet he knows from sore experience, that to fast from his early "tea" until next morning, leaves him too exhausted to sleep comfortably, to rise with vigour, or to enjoy breakfast. At length, if he reason at all, it becomes clear to him that to do what he thinks right in one respect, he must do wrong in another—a sufficient proof that there is error in the whole system.

CHAPTER III.

FOOD, HEAT, AND MOTION.

A FOOT-POUND A FOOT-TON A BRITISH UNIT OF HEAT—MECHANICAL-EQUIVALENT OF A BRITISH UNIT OF HEAT—COMBUSTION OF CARBON, CONSUMPTION OF OXYGEN, EVOLUTION OF HEAT—MODE IN WHICH THE HEAT EVOLVED FROM FOOD IS DISPOSED OF—COMPOSITION OF SOME OF THE PRINCIPAL ARTICLES OF FOOD AND THEIR HEAT-EQUIVALENTS.

⁂ See Essentials of a Normal Diet. Chapter IV.

The relation between food, heat, and mechanical force has been the subject of some of the most important investigations of late years, and the light which has been thrown upon it is one of the greatest steps in the progress of medical science. But so far as medical art and practice are concerned, very little application has yet been made of this advance in scientific knowledge. This is only what might be expected, considering the occult nature of the subject, and the scarcity of time among the great body of medical practitioners to master and familiarise themselves with the details of such departments of medical progress.

Nevertheless, it is high time that such facts as are at present known, and such applications of them as are at present possible, should be added to the common stock of knowledge possessed by practical medical men; for it is only in this way that the public can derive benefit from our advances in science.

For the purpose, therefore, of enabling practitioners easily to familiarise themselves with these matters, the following concise statement has been prepared:—

1. A *Foot-pound* is the amount of mechanical force required to raise a pound weight one foot.

2. A *British Unit of Heat* is the amount of heat required to raise the temperature of one pound of water one degree Fahrenheit.

3. This amount of heat (a British unit) may be converted into mechanical force sufficient to raise a pound weight 772 feet.

4. This amount of heat (a British unit) is generated by a pound weight falling through a space of 772 feet. Hence 772 foot-pounds is called the *Mechanical Equivalent* of a British unit of heat.

5. One ton weight is 2,240 lbs.; $\frac{772}{2240} = 0{\cdot}34465$; therefore, the heat units multiplied by 0·34465, will always give the mechanical equivalent in *Foot-tons*.

6. The heat of combustion of carbon and hydrogen *fully oxidised* (to CO_2 and H_2O) is as follows:—

$$1\text{ lb.}\left\{\begin{matrix}\text{C evolves } 14{,}500\\ \text{H} \quad ,, \quad\ \ 62{,}032\end{matrix}\right\}\text{ British Units of Heat.}$$

7. The total heat of combustion of a compound containing H and C is the sum of the quantities of heat which the C and H contained in it would produce separately by their combustion.

8. It has been found that the presence of *Hydrogen with Oxygen in the proportion to form water does not affect the total heat of combustion.* It is only the *excess of Hydrogen* that can be made serviceable as a source of available heat.

9. The mean consumption of oxygen by an adult man of average stature (weight 150 lbs.) taking ordinary exercise is about 30 ozs. avoirdupois in 24 hours, and the heat evolved by each 1 oz. of oxygen in combining with carbon, hydrogen, etc., is about 340 British units. Hence, 10,000 British units of heat will be evolved every 24 hours by the combination of 30 ozs. of oxygen with carbon, hydrogen, etc.; therefore, the food of an adult man, under

ordinary circumstances, should be such as may, in addition to other purposes, evolve at least 10,000 British units of heat.

10. Practical experience in the dieting of large numbers of men, and other means, have enabled us to establish the fact, that such an average man, as above described, requires, for the maintenance of health, a diet which shall contain about 4 ozs. of plastic materials, 3 ozs. of fat, and 10 ozs. of carbo-hydrates; and on careful analysis of this diet, we find that it can supply the required 10,000 British units of heat—viz., 2,516 from the plastic, 3,357 from the fat, and 4,150 from the carbo-hydrates; total, 10,023.

11. The mode in which these 10,000 British units of heat are disposed of, and the purposes which they serve, may be seen in the following calculation which has been made as nearly correct as possible. 8,000 British units are required as sensible heat,—to raise the temperature of the inspired air to the temperature of the body, to vaporise the pulmonary halitus, and to maintain animal heat. The mechanical equivalent of 2,000 British units (equal to 690 foot-tons) is expended in actual work, more than half of which is employed in internal vital work (the mechanical work of the heart alone is equivalent to 200 foot-tons; respiratory and other vital movements may be estimated as equivalent to nearly 200 foot-tons more), leaving about 290 foot-tons available for external work, which may be represented by the labour of walking 16 miles; but of course only so much is available for actual walking, as is not used in the other external movements of the body, which we daily perform.

In the following table the conditions laid down in No. 6, 7, 8, of the foregoing paragraphs have been observed in calculating the British units of heat given in the last column.

The composition of the articles of food in this table will not be found to agree exactly with *any one* published analysis. 186 separate analyses by eminent chemists have been examined and compared for the purpose of fixing, as nearly as practicable; the approximate *mean* composition of each article.

Articles of Food.	Ozs. Avoirdupois.	Plastic.	Fat.	Saccharine.	Acid Gelatine, etc.	Complement.	Mineral.	Water.	N.	H.	O.	C.	British Units of Heat.
Apple	1·000	·002	—	·136	·001	·022	—	·839	—	·009	·072	·058	53
Bacon (dried) . .	1.000	·084	·625	—	—	—	·005	·286	·013	·078	·078	·540	754
Bread	1·000	·100	·007	·453	—	·010	·010	·420	·016	·037	·247	·260	259
Butter	1·000	·010	·860	—	—	—	·010	·120	·002	·100	·083	·685	968
Cheese	1·000	·308	·256	·024	—	—	·047	·365	·049	·053	·108	·378	495
Egg	1·000	·150	·108	—	—	—	·025	·717	·024	·023	·045	·166	218
Fig (dried) . . .	1·000	·050	·009	·570	—	·150	·034	·187	·008	·044	·329	·248	236
Fish (fresh) . .	1·000	·166	·008	—	—	—	·029	·797	·026	·013	·039	·096	118
Flour (Wheat) .	1·000	·142	·010	·698	—	·013	·012	·125	·023	·056	·377	·394	392
Indian Corn Meal	1·000	·081	·045	·700	—	·028	·008	·138	·013	·056	·367	·390	393
Meat (Butcher's) cooked . .	1·000	·225	·089	—	—	—	·025	·661	·036	·026	·060	·192	245
Milk (new) . . .	1·000	·045	·031	·048	—	—	·006	·870	·007	·010	·039	·068	81
Oatmeal . . .	1·000	·150	·058	·532	—	·096	·038	·134	·024	·052	·302	·362	383
Pea (dry) . . .	1·000	·219	·015	·469	—	·133	·027	·137	·035	·048	·283	·337	354
Pork (fresh) . .	1·000	·175	·160	—	—	—	·022	·643	·028	·031	·055	·221	293
Potatoes . . .	1·000	·017	—	·230	—	·016	·011	·726	·003	·016	·117	·111	106
Rice	1·000	·051	·004	·817	—	·033	·005	·090	·008	·057	·414	·393	376
Suet	1·000	—	·860	—	·020	—	—	·120	·003	·101	·086	·690	975
Sugar (loaf) . .	1·000	—	—	·900	—	—	—	·100	—	·059	·460	·381	350
Vegetables (fresh)	1·000	·01	·002	·078	—	·008	·007	·895	·002	·006	·043	·039	38

The Mechanical Equivalent of the British Units of Heat may be calculated according to the directions given at p. 49.

CHAPTER IV.

NORMAL DIET.

ESSENTIALS OF A NORMAL DIET—MODE OF CONSTRUCTING DIETS—EXPENSIVE DIETS AND CHEAP DIETS FOR MAINTAINING HEALTH—TABLES AND ANALYSES.

ESSENTIALS OF A NORMAL DIET.

(See Food, Heat, Motion.)

A healthy adult man of average stature taking moderate exercise, will require and can consume, daily, from 32 to 40 ounces avoirdupois of *dry* nutritious food, which should have the following characters:—

1. About $\frac{1}{200}$ must be mineral matter.

2. From $\frac{2}{5}$ to $\frac{1}{2}$ may be water, leaving $\frac{3}{5}$ or not less than $\frac{1}{2}$ or from 15 to 20 ozs. of anhydrous solid alimentary material.

3. Three or four ounces of plastic matter must be combined with three or four times that quantity of heat-giving material.

4. The heat-giving constituents must contain a mixture of fats (hydro-carbons) with saccharine materials (carbo-hydrates), in the proportion of about 1 of the former to 3 of the latter.

5. These heat-giving constituents should supply from 6 to 10 ounces of carbon, the exact amount required varying with season, exercise, etc.

6. The Articles of Food must be sufficiently varied to

meet the requirements of the taste and of the appetite, and their Mechanical and other Conditions must be suited to the digestive powers of the stomach.

In addition to these characters, every complete diet must contain some potash-vegetable or fruit; and the total amount of water taken in 24 hours, *including that contained in the dry food,* must not be less than 70 ozs. avoirdupois.

DIET TABLES FOR THE MAINTENANCE OF HEALTH IN ADULTS LIVING IN THE CLIMATE OF THE UNITED KINGDOM.

Each diet table contains all the essential elements of nutrition, in forms, quantities and proportions necessary to the maintenance of health. The tables have been made complete without alcohol, leaving this to be ordered or not, according to circumstances. But, if spirituous liquors are added to any diet table, the quantity of carbon which they contain must be borne in mind. (See Alcohol Table Chapter V.)

It will be observed that the totals of the corresponding columns of the analyses are nearly the same in all the diet tables, showing the important fact that all the essentials of a normal diet may be equally secured in a diet that is simple and cheap and in one that is complicated and expensive.

In all diets Salt must be used and in those which do not include Potatoes some other Potash-vegetable or Fruit or Cresses or Lime or Lemon juice must be taken.

No. 1.

Liquid. fluid ozs.	Dry. ozs.	Food for 24 hours.	Water. ozs.	Plastic. ozs.	Fat. ozs.	Saccharine. ozs.	Carbon. ozs.
	6	Meat, Poultry or Game (cooked) .	3·97	1·35	·53	....	·42
	4	Fish . . .	3·19	·66	·03	....	·02
	10	Bread . . .	4·20	1·00	·07	4·53	1·93
	8	Potatoes . .	5·81	·14	....	1·84	·76
	2	Rice . . .	·18	·10	·01	1·63	·73
	2½	Sugar . . .	....	....	....	2·50	1·05
	2½	Butter . . .	....	....	2·50	....	1·85
5		Milk . . .	4·34	·25	·17	·21	·22
16		Coffee . . .	15·77	....	....	·22	·10
16		Tea . . .	15·05	....	....	·05	·02
17		Water . . .	17·	—	—	—	—
54	36		70·41	3·50	3·31	10·98	7·01
				In Plastic matter . . .			1·89
				Total . . .			8·99

No. 2.

Liquid. fluid ozs.	Dry. ozs.	Food for 24 hours.	Water. ozs.	Plastic. ozs.	Fat. ozs.	Saccharine. ozs.	Carbon. ozs.
	8	Meat, Poultry, or Game (cooked) .	5·29	1·80	·71	....	·56
	12	Bread . . .	5·04	1·20	·08	5·44	2·32
	12	Potatoes . .	8·71	·20	....	2·76	1·14
	2	Butter . . .	....	....	2·00	....	1·48
	2	Sugar . . .	....	....	....	2·00	·84
5		Milk . . .	4·34	·25	·18	·21	·23
16		Chocolate . .	15·20	·07	·32	·38	·42
16		Tea . . .	15·95	....	....	·05	·02
16		Water . . .	16·00	—	—	....	—
53	36		70·53	3·52	3·29	10·84	7·01
				In Plastic matter . . .			1·90
				Total . . .			8·91

No. 3.

Liquid. fluid ozs.	Dry. ozs.	Food for 24 hours.	Water. ozs.	Plastic. ozs.	Fat. ozs.	Saccharine. ozs.	Carbon. ozs.
	18	Bread . . .	7·56	1·80	·12	8·15	3·47
	3½	Cheese . . .	1·28	1·07	·89	·08	·70
	3	Bacon . . .	·76	·25	1·88	....	1·48
	1½	Sugar . . .	....	....	....	1·50	·63
5		Milk	4·33	·25	·17	·21	·22
20		Chocolate . .	19·00	·10	·40	·50	·50
20		Tea . . .	19·93	....	....	·07	·04
20		Water . . .	20·00	—	—	—	—
65	26		72·86	3·47	3·55	10·51	7·04
				In Plastic matter . . .			1·87
				Total . . .			8·91

No. 4.

Liquid. fluid ozs.	Dry. ozs.	Food for 24 hours.	Water. ozs.	Plastic. ozs.	Fat. ozs.	Saccharine. ozs.	Carbon. ozs.
	8	Fish	6·38	1·33	·06	....	·05
	16	Bread . . .	6·72	1·60	·11	7·25	3·09
	8	Potatoes . .	5·81	·14	....	1·84	·76
	2½	Butter . . .	....	....	2·50	....	1·85
10		Milk . . .	6·93	·40	·28	·34	·36
20		Cocoa . . .	19·10	·10	·60	·20	·56
	1½	Sugar . . .	....	....	....	1·50	·63
25		Water . . .	25·00	—	—	—	—
55	36		69·94	3·57	3·55	11·13	7·30
				In Plastic matter . . .			1·93
				Total . . .			9·23

No. 5.

Liquid. fluid ozs.	Dry. ozs.	Food for 24 hours.	Water. ozs.	Plastic. ozs.	Fat. ozs.	Saccharine. ozs.	Carbon. ozs.
	16	Bread . . .	6·72	1·60	·11	7·25	3·09
	3	Peas . . .	·41	·65	·04	1·40	·65
	4	Bacon . . .	1·14	·33	2·50	....	1·98
	2	Cheese . . .	·73	·61	·51	·05	·40
10		Milk . . .	6·94	·40	·28	·34	·36
20		Coffee . . .	19·71	....	....	·28	·13
	1	Sugar . . .	....	....	....	1·00	·42
35		Water . . .	35·00	—	—	—	—
63	26		70·65	3·59	3·44	10·32	7·03
		In Plastic matter . . .					1·94
		Total . . .					8·97

No. 6.

Liquid. fluid ozs.	Dry. ozs.	Food for 24 hours.	Water. ozs.	Plastic. ozs.	Fat. ozs.	Saccharine. ozs.	Carbon. ozs.
40		Milk . . .	34·68	2·00	1·40	1·68	1·80
	4	Rice . . .	·36	·20	·02	3·26	1·46
	3	Eggs (two) . .	2·15	·45	·32	....	·26
	2½	Sugar . . .	....	....	....	2·50	1.05
	1	Butter . . .	....	....	1·00	....	·74
	9	Bread . . .	3·78	·90	·06	4·08	1·74
30		Water . . .	30·00	—	—	—	—
70	19½		70·97	3·55	2·80	11·52	7·05
		In Plastic matter . .					1·92
		Total . .					8·97

No. 7.

Liquid. fluid ozs.	Dry. ozs.	Food for 24 hours.	Water. ozs.	Plastic. ozs.	Fat. ozs.	Saccharine. ozs.	Carbon. ozs.
	20	Bread . . .	8·40	2·00	·14	9·06	3·86
	3	Eggs (two) . .	·21	·44	·32	....	·26
	1½	Butter . . .	....	....	1·50	....	1·11
20		Milk . . .	17·34	1·00	·70	·84	·90
20		Cocoa . . .	19·10	·10	·60	·20	·56
	¾	Sugar . . .	....	....	....	·75	·31
25		Water . . .	25·00	—	—	—	—
65	25¼		70·05	3·54	3·26	10·85	7·00
			In Plastic matter . .				1·91
			Total . .				8·91

No. 8.

Liquid. fluid ozs.	Dry. ozs.	Food for 24 hours.	Water. ozs.	Plastic. ozs.	Fat. ozs.	Saccharine. ozs.	Carbon. ozs.
	8	Rice . . .	·72	·40	·03	6·54	2·93
	7½	Eggs (five) . .	5·40	1·11	·80	....	·65
	2½	Sugar . . .	....	....	....	2·50	1·05
	1¼	Butter . . .	....	....	1·25	....	·92
40		Milk . . .	34·68	2·00	1·40	1·68	1·80
30		Water . . .	30·00	—	—	—	—
70	19¼		70·80	3·51	3·48	10·72	7·35
			In Plastic matter . .				1·89
			Total . .				9·24

No. 9.

Liquid. fluid ozs.	Dry. ozs.	Food for 24 hours.	Water. ozs.	Plastic. ozs.	Fat. ozs.	Saccharine. ozs.	Carbon. ozs.
	9	Flour . . .	1·13	1·28	·09	6·28	2·82
	1¾	Suet . . .	....	....	1·75	....	1·38
	3	Sugar . . .	....	....	....	3·00	1·26
	6	Eggs (four) . .	4·32	·88	·64	....	·52
27		Milk . . .	23·41	1·35	·94	1·13	1·21
42		Water . . .	42·00	---	---	---	---
69	19¾		70·86	3·51	3·42	10·41	7·19
			In Plastic matter . .				1·89
			Total . .				9·08

No. 10.

Liquid. fluid ozs.	Dry. ozs.	Food for 24 hours.	Water. ozs.	Plastic. ozs.	Fat. ozs.	Saccharine. ozs.	Carbon. ozs.
	16	Oatmeal . .	2·14	2·40	·93	8·51	4·46
22		Milk . . .	19·07	1·10	·77	·90	·99
	1¾	Butter . . .	....	....	1·75	....	1·30
	¾	Sugar . . .	....	....	....	·75	·32
49		Water . . .	49·00	---	---	---	---
71	18½		70·21	3·50	3·45	10·16	7·07
			In Plastic matter . .				1·89
			Total . .				8·96

No. 11.

Liquid. fluid ozs.	Dry. ozs.	Food for 24 hours.	Water. ozs.	Plastic. ozs.	Fat. ozs.	Saccharine. ozs.	Carbon. ozs.
	25	Bread . . .	10·50	2·50	·17	11·33	4·82
	3¼	Cheese . . .	1·18	1·00	·83	·08	·65
	2	Butter . . .	....	....	2·00	....	1·48
60		Water . . .	60·00	---	---	---	---
60	30¼		71·68	3·50	3·00	11·41	6·95
			In Plastic matter . .				1·89
			Total . .				8·84

The following diet table was arranged, with great regard for both economy and health, for a charitable institution, the inmates of which consisted of *children averaging about ten years of age*, who had all been taken from utterly destitute homes.

No. 12.

Liquid. fluid ozs.	Dry ozs.	Food for 7 days.
	16	Meat (cooked)
	122	Bread
	2	Rice
	12	Potatoes
	10	Suet Pudding (see recipe, Chap. IX.)
	5	Flour Pudding (see recipe, Chap. IX.)
	4	Cheese
	2	Peas (dry)
	4	Indian Corn Meal
	½	Cocoa (dry)
	3	Treacle
	12	Green Vegetables
	7	Dripping or Butter
80		Milk
210		Water (in addition to that contained in dry food.)
290	199½	

This standard diet to be provided per head for all the children in the Asylum and whatever is not taken by those under 10 years of age to be allowed to those over 10.

Chemical (approximate) composition *Per Day.*

Water. fluid ozs.	Plastic. ozs.	Fat. ozs.	Saccharine. ozs.	Carbon. ozs.
65·	3·37	2·07	10·50	6·05
In Plastic matter . .				1·76
Total . .				7·81

The attention of those who visit the poor is requested to the following paragraph.

There is considerable difficulty in selecting diets for the very poor, which combine cheapness and simplicity with the essential chemical composition, in a form which the stomach will tolerate. But the two following will be found to fulfil all these conditions, so far as it is possible to do so without the introduction of meat; and in one of them bread is given in the largest quantity consistent with health:—

No. 13.

Allowance for twenty-four hours: Bread, 25 oz.; cheese, 2 oz.; butter, suet, or dripping, 2 oz. These yield to analysis: plastic material, 3·1 oz.; fat, 2·3.; saccharine material, 11·4 oz.

No. 14.

Allowance for twenty-four hours: oatmeal, 16 oz.; milk, ½ pint; butter, suet, or dripping, 1 oz. These yield to analysis: plastic material, 3·0 oz.; fat, 2·3 oz.; saccharine, 9·0 oz.

To each of these diets must be added limejuice or some land vegetable, salt, and a free supply of pure water. (See appendix on Bread diet and Typhus fever).

CHAPTER V.

FERMENTED LIQUORS.

Acid and Sugar in Spirituous Liquors—Ardent Spirits and their Peculiarities—Administration of Alcohol —Porperties of Various Wines—Wines in general— Spanish Wines—Greek Wines—German Wines— Hungarian Wines—Alcohol table showing the analysis of Spirituous Liquors.

ACID AND SUGAR IN SPIRITUOUS LIQUORS.

It is important to remember that although a fluid may contain much acid and therefore be unfit for some stomachs, it will not *generate acid* if it is free from saccharine matter, whereas a fluid containing saccharine matter will generate acid although it may not contain any.

ARDENT SPIRITS AND THEIR PECULIARITIES.

Brandy makes people nervous, Gin weakens, Rum and Whiskey produce biliousness, Whiskey is the least objectionable. None should be taken neat, and when mixed with water or other fluids they should be well incorporated by pouring many times from one vessel to another. When Whiskey produces biliousness, Rum, which has been made hot and then cooled, may be tried instead.

ADMINISTRATION OF ALCOHOL.

According to my own experience, based upon long and careful observation, an average-sized adult man taking moderate exercise may drink with advantage enough fermented liquors, each 24 hours, to represent from one to two ounces avoirdupois of *absolute* alcohol equivalent to from 1¾ to 3½ ounces of proof spirit—provided it be always diluted to the extent of 10 fluid ounces (half-a-pint imperial) of water or some other unfermented liquor to each ounce avoirdupois of *absolute* alcohol, and that it be taken when there is food in the stomach. (See Chapter IV. and Appendix).

THE PROPERTIES OF VARIOUS WINES.

The subject of wine has of late years become so extensive—embracing so many considerations connected with such numerous varieties of wine from different parts of the world,—that I have thought it best to give the practical experience of several recognized authorities specially acquainted with different departments of the subject.

I am glad, therefore, to be able to present the following matter from such reliable sources.

The observations on *Wines in General* are from the pen of my friend Mr. James L. Johnston, late Principal Inspector of Customs Laboratories, who has, undoubtedly, more correct practical and scientific knowledge of fermented liquors than any other person in this country.

For the account of the wines of Spain I am indebted to Mr. F. W. Cosens the celebrated Spanish wine merchant.

The description of the Wines of Germany and of the distinctive medicinal properties attributed to them in the districts where they are grown, has been kindly furnished by Mr. M. A. Verkrüzen of Fell Street, City, who is well known to have devoted much time to this subject.

Mr. Denman, of Piccadilly, the principal introducer of the Wines of Greece, and the author of several works on wine, has favoured me with the concise statement of the medicinal properties attributed to these wines by the numerous medical men who have communicated to him their experience.

For the notice of the wines of Hungary I am indebted to Mr. Max Greger of Mincing Lane, City, who first introduced the pure Hungarian wines into this country, and who has so creditably maintained his character both for a scientific and practical knowledge of the wines of his native land, and for *the conscientiousness with which he attends to the orders of medical men,* when they consider it important that only the purest and most mature wines shall be supplied to their patients.

I give the statements of these several authorities in their own words, and they are responsible for them; but, so far as it is practicable for one person to do so, I have endeavoured to test the correctness of their opinions by my own experience.

I have only further to add, that there is no department of commerce in which "commercial immorality" is so atrociously and so easily practised as in the wine trade, the most professed connoiseurs being often the most "taken in;" and, that I know of no protection against the misfortune of drinking half poisonous trash instead of genuine wholesome wine, except that of cautiously selecting a wine merchant of known honour and probity, and then leaving to him the entire responsibility of choosing your wines.

WINES IN GENERAL.

(By James L. Johnston, Esq.)

In the economy of nature wine has always held a prominent position. Corn, and wine, and oil, represent the highest agricultural development of the vegetable world—the corn and oil to nourish and sustain, and the wine to invigorate, refresh, and solace life.—In considering the subject of diet, therefore, whether for health or sickness, so important an element cannot be ignored; seeing that, while in health it contributes largely to the enjoyment of life, in sickness it is a powerful auxilliary to the Physician, more particularly under certain morbid conditions affecting both body and mind. In all ages, in wine-producing countries especially where it is best known and appreciated, wine, *rationally used,* has been regarded as a valuable means of promoting health, of prolonging life, and of adding to its enjoyment; but the penalties which follow the *abuse* of any of those gifts, provided and intended, by the Creator for the benefit of his creatures, as certainly follow its *misuse.* This requires no argument to demonstrate, it is within the knowledge of every thinking observer, nor does it furnish any reason for the *disuse* of wine, for there are few of the most valuable medicaments which are not poisonous if used without discretion. With these prefatory remarks I will proceed to consider briefly the constitution and varieties of wine, its natural and commercial alcoholic force, and its hygienic properties.

Strictly defined, wine is the fermented juice of the grape. But this theoretical definition is not quite carried out in practice. When perfectly fermented, wine becomes what is technically termed "dry," meaning that the whole of its sugar has been converted into alcohol, within certain limits however, inasmuch as the production of alcohol, at a certain point, arrests the fermentation and further production of spirit, leaving a margin of unconverted sugar (where that constituent is in excess) to enhance the richness of the wine, as in the instance of the celebrated Sauterne known as Chateau D'Yquem. For the same reason extraneous spirit added to the fermenting "must," has the effect of arresting further action, and retaining the unconverted sugar as an element of richness in the liquid. This is the course followed, with recent modifications and exceptions however, in the manufacture of the Port wine of commerce, and also of the red Tarragona wines of Spain intended to imitate and compete with Port in the English market.

Some wines are only partially fermented, in consequence of the over-richness of the "must," through the elimination of a considerable proportion of its watery constituent by natural or artificial means, as in the instance of the Essenz or Ausbruch wines of Hungary of which the Imperial Tokay, a wine of wonderful richness, is the highest type. Others again are not fermented at all, but the grape juice is simply inspissated or concentrated by slow boiling or simmering, as in the Tent wine made at Rota in Spain, and used generally for communion purposes in the Anglican Church. Of course under such circumstances this is merely a syrup or conserve of grape juice, and does not contain a particle of spirit in its natural state; but as it is customary to add from 20 to 30 per cent of spirit to it by way of preservative, it is put upon much the same footing as fermented wine, in respect of alcohol.

Effervescing or sparkling wines are the last variety. In them the fermentative action is not only arrested but imprisoned as it were, to form the "mousse," as it is called, which is at once their peculiarity and their charm.

Dry wines, whether still or sparkling, are preferable to all other kinds, from a medical point of view chiefly on account of their greater freedom from the objectionable unconverted sugar and their more easy digestion, in addition to which, their quality is invariably higher, as being under no disguise.

In almost every other respect the grand characteristics of wine are common to all, subject to certain modifications arising from climate or soil, from the latter of which especially some very important hygienic qualities are derived.

Colour is a distinction of little importance to the present question; it is obtained from the skin of the grape, when the bruised fruit is fermented in place of the expressed juice, red or violet when the black grape is used, from the blue colouring matter of the skins, and brownish-yellow in the case of the white grape from the apothema, which becomes darker by exposure to the air. But in many cases colour is an artificial production, notably in the case of brown sherries, in which it is owing to an admixture of boiled wine called vino de color; the normal colour of pure sherry, for example, is a pale greenish or brownish yellow, deepening with age. For these reasons pale sherries are to be preferred to golden, or brown in especial, as being purer.

The natural strength of wine is within a limited range from 18 to 30 per cent. proof spirit* (10·5 to 17·25 alcohol) which is rarely if ever exceeded. French Claret is a type of the lowest, and the wines of the Pyrenees Orientale and Spain generally, of the highest strength.

The majority however occupy the middle place, and comprise Sauternes, Burgundies red and white, the wines of the Rhine, the Moselle and the Danube, the Italian Peninsula (except Marsala) and the Grecian Archipelago, which are all within 20 and 25 per cent. proof spirit (11·5 to 14·5 alcohol.) These wines as a rule are brought to market in a nearly pure state, or with such inconsiderable additions of spirit as to be of little consequence.

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* Proof spirit is the ordinary potable spirit of commerce and is equivalent to nearly equal parts of alcohol and water.—See Alcohol table.

It may be taken for granted that no sparkling or effervescing wines can ever exceed the strength of 24 per cent. proof spirit (13·5 alcohol); their real variety, apart from the different sorts of wine employed, consists in the different proportions of sugar added as "liqueur" in the course of manufacture, and which varies from the pure or "brut" wine up to 18 and 20 per cent., the general average in the English market is midway, about 10 per cent., although the demand for the "dry" kinds is greatly on the increase. In prescribing these wines therefore the medical man is dealing with known forces as far as alcohol is concerned; but it is very different in respect of Port, Sherry, Madeira, and Marsala.

The Port wine of commerce is never under 35 per cent. proof spirit (20 alcohol) the average being 38·5 up to 42 proof spirit (22 to 24 alcohol) while Sherry, Madeira, and Marsala, although commencing a trifle lower, or at about 31·5 proof spirit (18 alcohol) advance almost if not quite as far.

Thus a rich vintage Port wine at 42 per cent., the usual strength of high-class Port wine, must have had 33 per cent. of proof spirit, or ⅓ of its bulk of ordinary brandy added to bring it to that condition.*

The same may be said of the cheaper red Tarragona wines lately introduced, and which bid fair to supersede the real Port wines in hospital practice. In its pure state this is a generous wine of considerable natural body and strength, and likely, if its use were encouraged, to become a favourite and wholesome beverage with the million.

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* Three glasses of such wine, therefore, represent about one glass of ordinary Brandy.

Although Sherries and other white Spanish wines are largely fortified in general for the English market, there are, amongst the drier sorts, Montilla, Amontillado, Manzanilla, and the lighter kinds termed Vino de pasto, many of which would only be injured by being fortified, and are consequently—the higher classes in particular—usually exempt from that debasing operation. Some of these are unequalled for sanitary purposes, especially in dyspeptic cases where the bitter principle (in Amontillado not unlike that of an orange-pip) appears to act as a tonic.

No wine has been so extensively imitated—the usual penalty of admitted excellence—as so-called Sherry; Hamburg especially is *facile princeps* in manufacturing an article called Elbe Sherry largely recommended in certain quarters, composed principally of Elbe water and potato-spirit flavoured in an ingenious manner with various extracts and ethers too numerous to mention, but which should be shunned as poison under whatever auspices it may present itself. There is scarcely a white wine vended which is not called Sherry and courts consumption under that popular and attractive pseudonym.

It would be out of place in a work of this description to show the different means by which the natural characteristics of wine are artificially heightened when weak, or supplied when altogether wanting—such as the elder flower on the Rhine and Moselle, the chamomile in Spain and the black currant leaf and raspberry in France to give "bouquet," the elder and black- and bilberry to give colour in Portugal and Spain. These are harmless compared with the abominably pernicious practice of "fortifying" beyond what is necessary for purposes of preservation where potato or beet-spirit, or some such cheap and nasty production is the agent employed.

SPANISH WINES.

(By F. W. Cosens, Esq.)

Of all those wines possessing distinct characteristics, and which impress the palate of the consumer in a marked degree, none is more prominent than that one of Spanish growth, known under the generic name of Sherry, and which is so called from being produced near the town of Jerez de la Frontera in Andalusia, around which cluster the oldest and most famous vineyards.

Of late years since railway communication has opened up the interior of Spain to the seaboard, a great impulse has been given to viticulture around Seville, the Montilla district near Cordova, and other outlying localities; the wines being light, genuine, and delicate, are in general favour as dinner beverages at moderate prices.

The area producing the veritable Jerez has been somewhat extended since Dr. Gorman, in 1851, published his statistical tables of the annual yield which he gave as 52,000 butts for the whole district.

There is, probably, little doubt but that the famous "Methuen treaty," while it secured a temporary monopoly for the wines of Spain and Portugal, induced a much more careful cultivation, and consequently a yield of superior wine; so much so, that since then Sherry has become a household wine as much by force of quality as by fiscal favouritism. Of course the usual penalty of excellence has to be paid, and Cape and Elbe Sherries have started into notoriety as cheap imitations, damaging the reputation of the pure produce of Jerez, in the estimation at least of the ill-informed.

From old records still preserved amongst the archives at Jerez we find that so early as 1268 vineyards are named as existing contiguous to the "Cartuja monastery" on the banks of the Guadalete which flows past the Portal, or Port of Jerez, a short distance from the town itself. It is also stated that in the year 1483 "no English or Breton ships have arrived this year in consequence of the war with the Biscayans," and in an old print of the time of the sack of Cadiz under Essex, men are seen carrying butts of wine slung by ropes suspended from their shoulders, to a boat on the beach, a vessel, apparently of English build, lying at anchor in the Bay, the casks are of precisely the same shape and character as those now in use.

There is no doubt that prior to 1483 the wines of Spain were consumed and appreciated in England. In 1419 William Horrold was placed in the pillory for counterfeiting and vending "olde and feble Spaynishe wyn for good and true Romeney."

This same counterfeiting, for a long period fostered by the half duty charged upon Cape wines, has no doubt led many medical men into error as to the exact hygienic effects of Sherry.

Judging from continental practice there are many maladies for which genuine and generous wine of the Sherry type is the only recognized and approved curative stimulant.

A large quantity of really superior Sherry finds its way annually into consumption in England, in fact all the costly and rare growths are exported to this country.

Domecq, Garvey, Gonzalez, Cosens, and others, devote themselves almost exclusively to the growing, rearing, and exportation of the produce of the oldest and best cultivated vineyards of the "*termino* of Jerez." These wines can be procured in a perfectly genuine state, and in the highest perfection, through the established channels of supply—wine merchants of credit and position.

Undoubtedly, good, sound, wholesome, young Sherry may always be procured at a moderate price; but those who look for high character and rare excellence must bear in mind that great resources are necessary to enable the shipper to breed fine wine; much time, skill, and patience, as well as technical aptitude are absolutely necessary to secure a favourable result. Fine Sherry must, therefore, always remain more or less costly; at the same time excellent wine may be procured at a moderate price, while "cheap and wholesome," is only as a rule another name for dear because inferior.

A teaspoonful of water in a glass of ordinary Sherry, will render it grateful to the delicate digestion of most dyspeptics.

The great rage for cheap wines since the introduction of Claret at a low duty, has undoubtedly stimulated the importation from the South of Spain of immature wines; such, improperly fermented, carelessly prepared, and of inferior growths have disgusted many consumers; and the medical profession have noted their baneful effects from a hygienic point of view.

Ford says in his Handbook, speaking of Manzanilla, "drink it ye dyspeptics," but as there are wines and wines, so are there Manzanillas and Manzanillas, no wine requires more time and skill to grow and rear—and probably, in its immature state, is more injurious to a delicate stomach.

A great deal of controversy has at times arisen as to whether the sprinkling of grapes with a very small quantity of gypsum is desirable or not; some assert that the lime in the sack, so feelingly alluded to by Falstaff, arose from this same sprinkling, especially as there is but little doubt that up to the early years of the 18th century, the "Sherris, sack" of history was quite a new wine exported from Spain almost a Must; hence all the empirical recipes given in such books, as the "Mysteries of Vintners" (1699), &c.

With reference to this sprinkling of gypsum practised since the days of Pliny its sole use is probably to counteract the effects of an over-production of albuminous matter dangerous to the wine during the years required to ripen and perfect it.

Genius in the management of Sherry has its value undoubtedly, but such must be supplemented by training.

Condition, time for bottling, refining, all these require long and patient study; the result being—from skill and good management, bottled sunshine—and from the contrary, Daffy's Elixir!

The Red wines of Spain are annually gaining favour, they are ripe at an earlier age than the White and possess dietetic and hygienic properties peculiarly their own. At the Claret duty of 1*s.* per gallon instead of 2*s.* 6*d.* they would probably become the Red wines of the million.

GREEK WINES.

(By J. L. Denman, Esq.)

WINE.	COLOUR.	PROPERTY.
St. Elie	White	Stimulant and exhilarating.
Thera	White	Restorative and supporting.
Santorin	Red	Tonic and restorative.
Kephesia	Red	Astringent and blood-making.
"	White	Refreshing and gently stimulating.
Patras	White	" "
"	Red	Tonic and stimulant.
Como	Red	Restorative and nutritive,

GERMAN WINES.

(By M. A. Verkruzen, Esq.)

German Wines when obtained in their native purity contain medicinal and health-promoting qualities of great value.

Foremost in medicinal respects we should consider the Moselle and Saar Wines; they are the lightest and contain the smallest proportion of alcohol and Saccharine matter, and are consequently not only the most digestible, but, from the considerable proportion of vinous and apple acid they contain, are powerful promoters of digestion; they act most beneficially upon the secretive and excretive organs and are great purifiers of the blood; whilst their stimulating power is of the mildest character, though most decidedly perceptible, as in the coldest weather they diffuse throughout the system a comforting sense of warmth.

Dr. Franz Meurer, Royal Prussian Resident Physician by Government appointment at Zell on Moselle, speaks in the highest terms of the curative and health-promoting qualities of these wines, as the result of his thirty years' practical experience.

He recommends them as most valuable in cases of Rheumatism, Gout, Dropsy, Stone, Gravel, Scorbutic and blood diseases generally.

In certain cases those younger and lighter wines which possess a larger proportion of vinous and apple acid are most beneficial; whereas, in other cases, fuller bodied wines of greater age and possessing a larger degree of alcohol (*always natural and not added to the wine*) and a less proportion of acidity, of whatever nature it may be, are most beneficial. It is a noteworthy fact that the Moselle and Saar wines, whilst containing more vinous and apple acid than other wines, not only do not sour the stomach like the sweet wines but actually counteract acidity of the stomach by promoting its healthy action.

In cases where Ports, Sherries, Clarets and Rhine wines produce acidity the Moselle wines frequently counteract it from the extraordinary lightness of their character and the mild and gentle nature of their appetising power which gently stimulates without irritating. As daily beverages no wines are more suitable. The higher class of these wines are the most recommendable in dyspeptic cases.

The principal growths are:

Wiltinger, Zeltinger, Brauneberger, Piesporter, Josephshöfer, Grünhäuser, Scharzberger and Scharzhofberger, *all white wines.*

These may be described as strongly diuretic and mildly laxative; the higher class, containing the least amount of acidity, might be considered perhaps, sedative, as they are wonderfully composing and comforting.

The Rhine and Palatinate wines, are of a stronger and more spirituous character than the Moselle and Saar wines, and consequently are more generous, yet amongst these there are many equally light and similarly refreshing.

Excepting in the case of the lighter sorts, we should recommend greater moderation in the enjoyment of these than of the Moselle wines.

Amongst the finest white growths are the following:

Rheingauer.

Marcobrunner, (light and very wholesome, diuretic).

Rüdesheimer, (full-bodied stout wine, generous).

Johannisberger Cabinet, (fine aromatic wine).

Steinberger Cabinet, (very fine grand wine, full-bodied).

Palatinate.

Deidesheimer, (fine, full, rather sweet wine).

Forster, (soft delicate wine, delicious bouquet).

Ruppertsberger, (very fine full-bodied wine, frequently almost spicy).

To say that any of the wines just named are specially diuretic, laxative, sedative, tonic, &c., would be hardly to represent them correctly, as they all possess these qualities more or less according to the quality, vintage, age, &c., &c., &c.

There are twenty or more distinctions of quality to be had in each growth, containing more or less alcohol, saccharine, vinous acid, fixed acid, volatile acid, tannin, &c., &c., according to the nature of the host of circumstances which have operated upon the production of the wine from the commencement to the completion of the process, and which differ with every season.

When invalids require wines for certain cases and objects they ought, after having consulted their medical adviser as to the nature or character of the wine that suits their case, to entrust their order to a wine merchant who understands his business and who is thoroughly conversant with the nature of the different wines constituting his stock. As a *sedative* he will give them a fine dry clean old neutral wine, no matter whether a Deidesheimer or Forster; as a *diuretic* he will give them a wine containing much vinous and fruit (apple) acid; as a *stomachic* he will select a wine having a considerable proportion of tannin, and to the *low spirited and down-cast* he will give a fine wholesome dry and sparkling wine.

Amongst the Red Wines of Germany we have several excellent sorts, suitable especially for convalescents and as family wines. Assmannshäuser and especially *Oberingelheimer* from the Rhine and the fine Walporzheimer wines from the valley of the Ahr are fine stomachic wines and great blood enrichers; in anæmic and other constitutions exhausted by debility, and also in persons of the phosphatic diathesis these wines are recommended.

Of the Sparkling wines of Germany, a pure Moselle without muscatel and other artificial flavouring is the most wholesome, and in cases of weak digestion I should consider such a wine decidedly preferable to Champagne. I have seen wind on the stomach which had almost constantly troubled the sufferer for three or four weeks to an alarming degree, entirely and effectually cured (so that during three weeks subsequently no recurrence whatever of the malady was perceived) simply by the use of a bottle of fine sparkling Moselle and ½ lb. dry, hard, short, biscuits taken about four hours and a half after luncheon; the stomach was gently brought into action by the wine and biscuits, the wind was expelled, the whole frame became warmed through, and a sense of extreme comfort ensued. By gently acting upon the stomach, and subsequently upon the bowels, liver, and kidneys, the wine no doubt removed to a great extent the causes which produced the wind and hence the relief experienced for so long.

In conclusion I may observe, that when fatigued, especially in hot weather, there is no such reviver as a glass of half soda water and half still Hock or fine Moselle: the effect is truly marvellous.

HUNGARIAN WINES.

(By Max Greger, Esq.)

I can speak with the utmost confidence of the medicinal properties of the different kinds of Hungarian wines, not only from many years of personal experience in the districts where they are grown, but from reports that have been forwarded to me, in some hundreds of letters, by medical men who have prescribed these wines in their practice.

In prescribing Hungarian wines, it must be borne in mind that they are far richer in grape-sugar and consequently in alcohol than any of the French and German wines, they therefore require a year or two longer to finish fermentation, that is to say to accomplish their maturity. It is therefore of the greatest importance to obtain these wines from such sources as may leave no doubt that they are, first, *genuine*, and secondly, *matured.*

Hungarian wines, generally speaking, are full in body, and whilst most other cheap light wines will produce a feeling of coldness, a glass of good Hungarian wine will produce a sensation of warmth all over the body.

In anæmia and Chlorosis, and in exhaustion from loss of blood, especially by women after childbirth and in chronic nose-bleeding, great benefit is derived from the use of the Hungarian Red wine, Carlowitz. It is also administered with advantage in bilious disorders, sluggish action of the liver and hæmorrhagic affections.

Ofner Auslese is prescribed with excellent effect in diarrhœa, and if the case is urgent half an ounce of cinnamon and an ounce of cane sugar are added to one bottle of wine, which, if well boiled together for half an hour and taken hot at bed time, will produce a very agreeable soothing effect on the bowels. In Hungary, Ofner Auslese is the household remedy for diarrhœa, especially during cholera epidemics.

Amongst the white wines of Hungary, Somlau should be selected as a substitute for the, so-called, dry sherries of Spain; Œdenburg and Ruster Ausbruch (dry), where the tartaric acid contained in all red wines seems objectionable.

The Ruster is especially valuable in convalescence from exhausting diseases, sleeplessness and weak digestion, and in Hungary is considered a valuable sedative in neuralgia.

While the Œdenburgh finds especial favour with gouty persons, many of whom have been unable to touch any other kind of wine. It has distinctly diuretic properties attributed to it.

The different kinds of Hungarian sparkling wines, are pleasingly exhilarating, leaving but little after depression even when they have been taken to excess. They, therefore, constitute a satisfactory stimulant where exhilaration rather than alcoholic stimulation is desired.

The finest Crown Tokay is an extraordinarily restorative wine, spreading warmth throughout the body to the tips of the toes and fingers, and is therefore of singular value to the old and feeble. It is, however, very rarely found of genuine quality, and when genuine is of great cost.

ALCOHOL TABLE.

The *weight* of Absolute Alcohol (spec. grav. ·793 at 60° Fht.) and of solid dissolved, in *measured* quantities of Spirituous Liquors.

SPIRITUOUS LIQUORS. * The strength of Ardent Spirits is arbitrary, the strengths here given are the commercial average.		*** This column shows the quantity by measure of each Spirituous Liquor which contains 1 OZ. AVOIRD. of absolute Alcohol.	1 oz. avoir. of Carbon is contained in fluid ozs.	One Imperial Pint contains		Per cent of		
				Extract. — ozs. avoird.	Carbon. — ozs. avoird	Extract.	Alcohol.	Equivalent of proof spirit.
		Fluid oz.						
ARDENT* SPIRITS.	Proof Spirit	2·26	4·3	—	4·6	—	57·15	100
	Whisky	2·6	5·0	·1	4·0	·6	48·3	84·5
	Brandy	2·7	5·0	·2	4·0	1·2	47·1	82·4
	Rum	2·8	5·3	·2	3·8	1·1	45·0	78·8
	Gin (sweetened) . .	3·2	5·5	·9	3·6	4·5	39·8	69·6
WINES.	Port	6·9	10·2	1·1	2·0	5·5	22·0	38·5
	Lisbon (*White*) . .	9·0	7·8	3·5	2·6	16·1	12·0	21·0
	Buccellas	7·3	11·2	0·9	1·8	4·4	16·0	28·0
	Madeira	6·8	11·0	0·7	1·8	3·5	22·0	38·5
	Sherry (of commerce)	6·5	10·0	1·0	2·0	4·6	20·6	36·0
	„ Montilla and Amontillado .	6·8	10·1	1·1	2·0	5·6	18·3	32·0
	„ Natural . .	9·0	7·8	1·5	2·6	5·2	14·5	25·3
	Marsala	7·5	11·7	0·9	1·7	4·4	19·5	34·0
	Rousillon (Masdeu) .	6·3	8·5	1·7	2·4	8·0	20·6	36·0
	Burgundy	15·2	23·8	0·4	0·8	1·8	12·0	21·0
	Chablis (Montrachet)	19·0	27·0	0·5	0·7	2·3	12·0	21·0
	Claret	16·3	23·4	0·5	0·8	2·5	11·5	20·0
	Sauterne (Chateau d'Yquem . . .	9·0	7·8	3·5	2·6	16·1	12·0	21·0
	Hock (Johannisberg)	13·4	20·4	0·5	1·0	2·5	12·0	21·0
	Moselle	15·2	23·3	0·4	0·8	2·0	12·0	21·0
	Champagne and other effervescing or sparkling wines	12·6	11·3	2·3	1·8	11·0	13·5	23·6
	Hungarian *Red* (Carlowitz)	14·1	21·2	0·5	0·9	2·5	14·5	25·3
	„ *White* (Somlau) . . .	19·0	28·3	0·4	0·7	1·8	12·0	21·0
	„ Imperial Tokay (essenz) .	9·0	7·8	3·5	2·6	16·1	10·3	18·0
	Constantia (*Red* and *White*) . . .	9·0	7·8	2·8	2·5	15·0	11·5	20·0
	Frontignac	9·0	7·7	3·4	2·4	15·8	10·3	18·0
CIDER		64·0	40·0	·8	·6	3·7	5·2	9·1
MALT LIQUORS.	Ale, Burton, Bass, 84*s*.	12·5	9·0	3·4	2·2	15·7	10·1	17·6
	„ „ „ 60*s*.	14·2	13·0	2·0	1·5	9·6	8·9	16·6
	„ Pale „ 60*s*.	19·0	17·5	1·5	1·1	7·0	6·6	11·5
	„ India (Gardner, × 54*s*.) . . .	23·0	28·0	·6	·7	3·0	5·5	9·6
	„ Bottled Scotch (Edin.)	19·0	13·1	2·4	1·5	11·4	8·0	14·0
	„ Bottled Pale .	25·0	20·5	1·4	1·0	6·6	5·0	8·7
	„ "Eightpenny". .	22·7	22·2	1·1	·9	5·4	5·7	9·9
	„ Family 1*s*. gallon.	24·9	22·0	1·2	·9	5·7	5·4	9·4
	„ "Fourpenny" . .	25·4	23·0	1·1	·8	5·3	5·2	9·1
	Stout, Dublin, (bottled)	20·8	16·7	1·7	1·2	8·2	6·1	10·6
	„ London . . .	21·5	18·9	1·5	1·1	6·9	5·9	10·3
	Porter, London . .	35·6	26·6	1·2	·8	5·6	3·7	6·4

20 Fluid oz. =1 Imperial pint (measure). 16 oz. avoird.=1 pound (weight).

CHAPTER VI.

FAT.

FAT ESSENTIAL TO HEALTHY NUTRITION—IMPORTANCE OF DISTINGUISHING BETWEEN SOLID AND LIQUID FAT—BANTINGISM—GETTING FAT AND GETTING THIN—ANALYSIS OF BANTING-DIET, SHOWING ITS ERRORS AND ADVANTAGES.

Fat is so essential to the maintenance of healthy nutrition, that the quantity contained in the daily food cannot be reduced much below the proportions given in the "Essentials of a normal diet" and in the diet tables, without great risk of damaging the health.

When it is necessary for any special object to reduce the quantity of carbon taken in the aliments, this can more safely be done by diminishing the saccharine and amylaceous matters than the fats.

The importance of fat in nutrition should be studiously borne in mind by those who construct diets for the poor, for public institutions, or for the treatment of obesity, diabetes, fatty degeneration, dyspepsia, and the like.*

ON THE IMPORTANCE OF DISTINGUISHING BETWEEN SOLID AND LIQUID FATS.†

The peculiar isomeric modifications of which stearin and palmitin are susceptible, as shown by Duffy, pointedly distinguish them from olein, which, so far as at present known, has not this susceptibility; a distinction which is supported by the different behaviour of aleic acid towards chlorine and bromine, from that of stearic or margaric acids (Lefort), and by the different action of bile upon stearic acid and upon oleic acid (Marcet).

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* See Appendix "ON BREAD DIET, AND TYPHUS FEVER," also Chapter VII. "ON DIET IN DISEASE."

† Abstract of an Article by the Author in the "CHEMICAL NEWS, Sept. 4th, 1868."

But I think we ought to be prepared to learn, that solid and liquid fats differ in some important physiological properties, by the first general fact concerning the constitution of all natural fats—viz., that they are mixtures in varying proportions of at least four different bodies, of which the melting points so widely differ—stearin melting at 144° F., palmitin at 114·8° F., margarin (probably a compound of stearin and palmitin) at 116° F., while olein remains fluid at 32° F.

That the different degrees of solidity of fats depend upon the proportions in which the solid ingredients are mixed with olein, that olein has a peculiar power of dissolving the solid ingredients, and that the melting point of the mixture is thereby reduced, appear to me to be facts pointing in the same direction as the foregoing, especially when we remember that the affinity of oleic acid for oxygen is much greater than that of the other fatty acids.

The fatty bodies obtained from warm-blooded animals are generally solid at ordinary temperatures, whilst those from fish and from cold-blooded animals are liquid. And when we consider the high melting points of the solid fats as compared with the temperature of the body in warm-blooded animals, it is evident that the fat in them would be solid at the temperature of their blood, but for the mixture of olein, by which the melting point is reduced.

Therefore the solidity or fluidity of the fat in living animals is determined by the proportion of olein, which is able to be mixed with the stearin, palmitin, and margarin in each individual; and we are forced to conclude either that it is of no importance whether the fats of the body during life are in a solid or liquid state, or that it is important in what proportion the olein, stearin, etc., shall be combined.

It has been already proved by experiments on the fattening of cattle, that the solidity or fluidity of the fat in the body varies with the food—that cattle fattened upon linseed cake, for example, accumulate, in their adipose tissue, an oily material of unusual fluidity (Draper), and that the consistence of butter is dependent upon the kind of food given to the animals from which it is produced (Fownes).

The fat in animals is particularly liable to accumulate immediately beneath the cutis, in the omentum, and around the kidneys; and the fat found in the latter situation, where it is subject to a more uniformly elevated temperature than in the integument, is well-known to be of a more suety character—that is to say, it contains a smaller proportion of olein, and has a higher melting point. These familiar facts point again to some importance, in the animal economy, attaching to *the melting point of the fat and the consequent degree of fluidity* in which it should exist during life.

With regard to the fat of the integument—the principal deposit of adipose tissue in the body—it appears to me self-evident that the fluidity of this fat must vary with the temperature of the atmosphere in which the animal is placed; to what extent this is the case, is, in my opinion, a most important subject for enquiry; and although the experiments to determine the question are yet deficient, I hope soon to be able to supply them.*

In conclusion, what I now suggest as a general proposition, is this:—That, in all probability, the stability of the fats of the animal body in resisting too rapid oxidation is dependent upon the degree of solidity which they possess at the temperature of the living animal at any given time; that alterations in external temperature may affect the solidity of the adipose tissue of the integument, and, consequently, its power of resisting oxidation; and that, therefore, in all probability, it is of great importance that the food of an animal shall contain a certain proportion of material capable of supplying the adipose tissue with *solid* fat: *i.e.* fat having a high melting point.

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* This statement was first published in 1868, and, up to the present time 1872, the difficulties attendant upon the experiments have baffled those who have attempted to solve the question.

ON GETTING FAT AND GETTING THIN.

On comparing the following analysis of Mr. Banting's diet for getting thin with my tables of normal diets it will be seen that it yields less than half the normal quantity of Carbon, leaving the deficiency to be obtained from the fat already stored up in the system, by the consumption of which the obesity is removed. The fault consists in this reduction of Carbon being obtained by diminishing the Hydrocarbons (fats) of the food instead of only cutting off the Carbo-hydrates (Sugar and Starch).

MR. BANTING'S DIET. (APPROXIMATE ANALYSIS).

Liquid. fluid ozs.	Dry. ozs. avoird.	Food for 24 hours.	Water. ozs.	Plastic. ozs.	Fat. ozs.	Saccharine. ozs.	Carbon. ozs.
	14	Meat, Poultry, Game, and Fish	9·25	3·15	1·25	....	·98
	2	Bread . . .	·84	·20	·01	·90	·39
	2	Vegetables (green)	1·79	·02	....	·15	·07
	3	Fruit . . .	2·52	....	....	·40	·15
16		Tea . . .	16·00	....	....	....	·02
14		Wine (Claret) .	13·00	---	---	---	·70
30	21		43·40	3·37	1·26	1·45	2·31
		In Plastic matter . .					1·82
		Total . .					4·13

It has happened to me to have to do with a great number of persons who have tried Bantingism, and I do not hesitate to say that, up to the present time,* Mr. Banting has done a great deal more good than harm. He has not brought forward a single new fact or new idea, but he has had the luck, by zealously advertising a striking case of the effects of a plan of treatment long familiar to every medical man who understood physiology, to convince the public of the immense influence on the animal organism of modifications in the quality of food—an influence in the importance of which they did not half believe when urged upon them in the form of medical advice.

Mr. Banting candidly told his readers that he was ignorant ot the physiology of food, but they did not care for this while determined to try his plan, and hence it is not to be wondered at that while many have been benefitted many have done themselves harm. But the harm that has been done at present is not very great and is nothing to compare with the harm that will come, if, frightened by some striking case in which Bantingism has nearly cost a man his life, the public rush away from it as blindly as they rushed into it, and establish for a time such a popular prejudice against systems of diet, that a medical man shall not be able to institute those rational and scientific regulations of diet which are often more important than any other means of treatment in the management of disease......The plain and simple facts of the case are these. 1. A certain amount of fat in the system is one of the most essential elements of health. 2. The quantity required by different individuals to maintain health differs. 3. The effects of a deficiency of the quantity actually required in any given organism are most disastrous, the tissues of the body and the brain and nerves being at length disintegrated to supply the elements of fat which they contain. 4. When there is a quantity of fat in the body in excess of that necessary to health, it may be lessened with great and needed advantage provided it be done slowly and cautiously,—allowing the nutritive functions of the system to accommodate themselves gradually to the altered condition,—and most peremptorily stopping the loss of fat before it has amounted to a deficiency in the quantity necessary to healthy nutrition. *Nothing is easier than to make a fat man thinner by altering his diet,* but to do this safely and well is by no means devoid of difficulty, and in a large number of cases requires the greatest caution consideration and judgment on the part of those who rule the modifications in the diet of the patient. But there is no denying that, with such care and judgment, it can in most cases be done safely and advantageously.

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* This was first written in 1864 and I can safely repeat it now: 1872.

In the ARTIFICIAL FATTENING OF ANIMALS the indications to be complied with are very obvious; they are, first, to furnish an abundant supply of oleaginous material in the food; second, to prevent as far as possible waste by oxidation.

The first indication is satisfied by the purposed employment of oleaginous articles, as for instance, linseed-cake, or by the selection among ordinary food substances, of those which, like Indian corn, abound in oil. It is to be remarked that the increase of weight of an animal may take place in two ways: first, by adding fat to the deposit in the adipose tissues; or second, by development of the muscles. It might perhaps be permissible to speak of the former as adipose fattening, the latter as albuminised fattening. According as it has been subjected to one or other of these processes, an animal will be very differently prepared for undergoing severe exercise. A horse fed with Indian corn cannot maintain himself under severe exercise so well as if he had been fed on oats. In the former case his adipose tissues have been developed, in the latter his muscular.

The second indication is met by resorting to every expedient which can restrain the action of the respired oxygen. A state of perfect quiescence is therefore to be observed. Muscular movement of every kind increases the activity of respiration. On the contrary, rest diminishes it. If in addition to this state of quiet or rest, sleep likewise be indulged in, the object is still more perfectly attained; and if a high temperature be also resorted to, since this checks the oxidation needful for maintaining the system at its due temperature, this further diminishes the waste of fat.

Under such circumstances, where everything is done to give a supply of fat, and everything to prevent its consumption, it may be caused to accumulate in the tissues to an extraordinary amount. But this very soon interferes with the action of the liver.—See Draper's *Physiology,** pp. 251, 252.

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* Further information regarding fat, its importance in the organism, its relation to Disease, and the means of accumulating fat, will be found in my works "ON TUBERCULOSIS" and "ON THE TRUE FIRST STAGE OF CONSUMPTION."

CHAPTER VII.

ON SOME PRINCIPLES OF DIET IN DISEASE.*

ON THE DIET OF SICKNESS—PRINCIPLES UPON WHICH TO ARRANGE THE DIET OF DISEASE—RULES FOR CARRYING OUT THESE PRINCIPLES—EXAMPLES OF DIETS FOR CONSUMPTION, AND FOR DIABETES.

The subject which I have chosen for to-day's lecture is one upon which it would be very easy to write a large book, but which is very difficult to treat in a short lecture. I must content myself, therefore, with condensing what I have to say into a few statements of opinion, avoiding all attempts at discussion, and if I appear to deliver my views dogmatically, you will, I hope, understand that it is not because I feel at all inclined to dogmatise, but because I am pressed by the extent of the subject, and the narrow limits of our time.

In my "Manual of Diet and Regimen"† I have given "the Essentials of a Normal Diet" for health. The question now is, how ought these to be modified in disease? You will observe that these "Essentials of a Normal Diet" provide for the maintenance of healthy nutrition in a "healthy adult man of average stature taking moderate exercise," and, for simplicity's sake, it will be best to make all our remarks apply to this "adult man of average stature" *under altered circumstances.*

The first and leading principle of diet in disease is, to provide for the maintenance of healthy nutrition, under the peculiar alterations of circumstances attendant upon disease. In other words, the diet of disease should be as nearly that of health as the altered conditions of the nutritive functions, and the altered conditions of the patient's life will allow; the grand object being to keep up healthy nutrition of the whole organism.

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* Substance of a lecture delivered by the Author at the Royal Hospital for Diseases of the Chest, in 1865.

† Now embodied in this work.

The true appreciation of this first principle, in its various bearings, will save us from running into either of those extremes which at different times have disfigured medical practice. We shall not be led to starve our patients upon water-gruel, when they are craving for natural food: or to stuff them with beef-steaks and porter, when every instinct of their nature rebels against it. In fact, you may take it as a very safe rule, that it is better cautiously to supply a patient with the kind and quantity of food that his stomach calls for, than to deny it to him without an unquestionably good reason for so doing.

This may seem to you very much like letting a patient eat and drink what he pleases. But that is not at all what I intend to recommend. All I mean is this, and I wish particularly to impress it, that if we intend to interfere in the subject of diet, we must take care that we thoroughly understand what we are about; (see p. 5) and in order to do this it is necessary to keep well up in the following subjects:—

1. The physiology of healthy nutrition.
2. The composition of food, and the essentials of a normal diet.
3. The physiology of disease.

If we keep these matters well before the mind, and at the same time keep our wits about us in watching the case under treatment, it is surprising what an immense deal of good may be done by interfering with the diet; but not otherwise.

We start, then, with this as our first principle, never to be lost sight of—that healthy nutrition is to be maintained, if possible, under all circumstances. And we assume that to do this in a "healthy adult man of average stature taking moderate exercise", the essentials of a normal diet, must be supplied.

It must be borne in mind that the proportions and quantities of the different elements of this normal diet are arranged to meet the requirements of the different functions of the organism when in a healthy state of activity; and it therefore follows, that if the activity of any of these functions is altered, the requirements will be altered: and hence, the second general principle is this:—To alter the quantities and proportions of the elements of a normal diet to correspond with any alterations in the conditions of life. Thus, when a man is overtaken by sickness, and confined to his room or bed, the adult man taking moderate exercise becomes *an adult man taking no exercise*; and the ingredients of his diet which were proportioned to his moderate exercise must now be proportioned to his no exercise; and other alterations must be made in like manner, to correspond with other altered circumstances, in addition to any that may be specially required by the nature of his disease.

But I must remind you that, even when a man is confined to his bed, and precluded from taking any kind of exercise, he is still necessarily undergoing a considerable amount of muscular exertion, which must be provided for in his diet. For example, so long as life remains, such all-important muscles as those of respiration, and the heart itself, continue to act, and to require that their healthy nutrition shall be provided for by a supply of plastic materials in the food.*

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* See "Food, Heat, and Motion."

We come next to the long list of alterations of function which may be involved in the term "Sickness." And the third principle is—To alter the forms, quantities, and proportions of the elements of a normal diet, to meet the altered relations in the activity and condition of organs consequent upon disease. It is evident that, in order to carry out our first principle of maintaining healthy nutrition under all circumstances, it may be necessary, under some conditions, to reduce the quantity of every element of diet; and also, under some circumstances, to alter the proportions of the different elements. This we see demonstrated in some of the lower animals by the phenomena of hybernation. When an animal gives itself up to its winter sleep, every vital function is reduced to its lowest degree of activity; and the animal is able to maintain healthy nutrition for a long period without taking any food at all; but as respiration has to be kept up more actively than the rest of the functions, a special store of carbon for this purpose is laid up beforehand in the body.

Now, supposing a man to suffer from any state of disease which should place him in the position, as regards his functions, of an animal during hybernation, it is clear that, while his whole diet must be reduced to a very low scale, the heat-giving elements must be supplied in quantities out of the normal proportions as compared with the rest; because no supply of carbon is stored up in preparation for his illness, as it is in the hybernating animal in preparation for its sleep.

We see conditions, in many respects similar to these in some stages of fevers, in which absorption, nutrition, and every vital function is at its lowest point consistent with life, respiration being the only one sufficiently active to call for any considerable supply of food. But here, of course, we must not lose sight of an element in the case not present in hybernation—viz., the existence of a poison, which by some means, natural or artificial, has to be eliminated or destroyed, and which may be keeping some functions in activity, the requirements of which must be met. The precision with which we are able to do this in any given case, will depend upon the correctness of our knowledge of the nature of the poison, and of the organs concerned in the restorative process. Here, no doubt, we are often obliged to act in the dark, and to supply many ingredients which may not be needed, in the hope of furnishing among them that which is required, but which our ignorance prevents us from identifying. And we had far better, whenever our knowledge is at fault, act in this safe manner and supply much that may be useless rather than run the risk of witholding that which may be essential to life. But, in the majority of cases, our knowledge will be sufficient for the emergency, if we keep in mind the general principles of action.

The fourth principle is this:—To obtain rest for every organ while it is suffering under active disease, by removing from the diet such elements as increase its functions. These are conditions which it is not always easy to fulfil without deviating from our first principle. For example —in the case of diseased kidney—the healthy nutrition of this organ requires a supply of albuminoid materials, while its function is increased by any surplus of these materials in the organism; and when its function is interrupted by disease, a proportion of albuminoids in the diet, necessary to the healthy nutrition of the organism generally, will be tantamount to an excess as regards the function of the kidney, and the accumulation of retained excretory matters will press injuriously upon the affected organ. In such a case other medical aids than diet must be brought to bear; and while the albuminoids in the food are reduced as low as is consistent with healthy nutrition, some auxiliary organs which are not damaged must be stimulated for the time, to save the diseased part from undue pressure upon its functions.

A simpler, but still important principle, may be stated as the fifth, viz.:—In all alterations of diet, to avoid any unnecessary reduction in the number and variety of the forms in which food is allowed to be taken. This becomes especially necessary to be borne in mind when dieting the dyspeptic, who are often still engaged in the active avocations of business and of society while under medical treatment. To treat such cases by cutting off from the daily bill of fare first one article and then another, till the food consists of only two or three permitted forms, is to destroy the appetite and the digestive powers by monotony of diet, and to depress the spirits of the patient by a constant series of petty denials. This plan of dieting can only be regarded as the resource of ignorance; because an enlightened view of the case will discover some particular defect in the function of digestion or assimilation which will at once indicate the form or element of the food which is to be avoided; and thus it will be only necessary to cut off those articles which specially represent this element, or simply to alter the forms in which they are presented to the stomach. (See p. 4.)

The sixth principle is also of great importance, viz.:—When it is necessary to remove from the food any of the essentials of a normal diet, to aim at selecting that which will answer the desired end with least danger to the nutrition of the vital organs. For example, if it is necessary for any special purpose to diminish the heat-giving elements of the diet, it is safer to remove the carbo-hydrates than the hydro-carbons, because the latter not only supply carbon for the evolution of animal heat, but are essential to the nutrition of the nervous system, and of the albuminoid tissues generally. (See Fat, Chapter VI).

The seventh and last principle which I shall give in this Lecture is of very general application :—When it is desired to *increase* the normal nutrition of a tissue or organ, we must not only supply it freely with the special materials requisite for its development, growth, and repair, but at the same time call upon it for the performance of its normal functions—over-fed idleness insures morbid nutrition, not healthy life.

In the next place I will give you a few *Rules* which may assist you in carrying out these general principles—

Rule 1.—When the power of appropriating any essential ingredient of a normal diet is lost to the organism, the lost function must be substituted by some artificial process, or the ingredient in question must be withdrawn from the diet till the normal function is restored. In obedience to this rule you see me at this hospital administer pancreatic emulsions of fat* to patients, who have lost the power of assimilating fat without this artificial assistance, while I adopt all practicable means of restoring the normal function.†

Rule 2.—Is inseparable from the first, and it is this :—No essential of a normal diet must be withdrawn without an attempt being made either to supply to the organism in some other way the ingredient of which it is deprived, or to suspend those functions which call for a supply of this ingredient. Thus, to take a simple illustration :—Suppose the power of digesting meat to be lost through a deficient secretion of gastric juice, meat must be withdrawn from the diet till the lost function is restored, or else an artifical digestive fluid must be introduced; or if it is impossible by these means to maintain the digestion of meat, the physiological ingredients of meat must be supplied in the form of some albuminoid solution; or, finally, if this cannot be done, then those functions which principally waste the albuminoid tissues of the body must be placed as far as possible in a state of rest, muscular action must be suspended until the function is restored.

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* See appendix for mode of preparing "Pancreatic emulsion."

† See Diets for Consumption.

Rule 3.—If an undue waste of any elements of normal nutrition is found to be going on in the organism, and the means remain of appropriating those elements from the food, they must be supplied in the food in quantities as much in excess of those proper to the normal diet of health as will be sufficient to supply the waste, until it is stopped. This also may be illustrated by a very simple example. In Bright's disease of the kidney there is no loss of the power to appropriate the albuminoids from the food, whereas a constant loss of albumen is going on through the kidneys, which must be met by proportionate increase of the albuminoids in the diet. But in following this rule, in this particular case, it will be necessary to observe the precautions which I mentioned when speaking of the fourth general principle.

Rule 4.—When through any defect in the organism, the elements of a normal diet are lost to nutrition if presented in the usual forms, those forms must be changed; but care must be taken that in the altered form all the essential elements of a normal diet are supplied in their proper quantities and proportions. Nothing can illustrate this better than the use of milk as a substitute for solid or mixed foods in diarrhœa or sickness.

Rule 5.—Has to deal with more complicated difficulties. If such a defect exists in the organism that *some* of the essentials of a normal diet are misappropriated, so that the organism is deprived of one or more of the normal elements of nutrition, and at the same time a disease is constituted out of the misappropriated food, then we have a double duty in interfering with the diet. First, the source of the disease must be stopped by withdrawing that part of the diet out of which it is constituted; and, secondly, the elements of nutrition thus removed must be supplied by some other means or in some other form.

Thus, in Diabetes the saccharine and amylaceous elements of the diet are misappropriated; they do not serve their normal function of supplying carbon for the evolution of heat, and by passing off through the kidneys they constitute an exhausting disease. It is necessary, therefore, to stop the source of this disease by cutting off the saccharine and amylaceous ingredients of the diet till normal nutrition is restored. But, in the meantime, as carbon must be obtained by some means, it is taken from the fat stored up in the body so long as that lasts, and when it is gone, from the albuminoid tissues themselves, till the whole organism is disintegrated; unless at the same time that we cut off the starch and sugar, we increase the quantity of *fat* supplied in the food as much in excess of the proportion proper to a normal diet as shall fully supply the demand.*

The modern dietetic treatment of Diabetes may be taken as a good example of the way in which increased knowledge of the nature of disease and of the physiology of food enables us to act under what I have called the fifth principle of diet, viz., to avoid any unnecessary reduction in the number and variety of the forms in which food can be taken. In former days the poor parched diabetic was forbidden to drink water lest he should increase his flow of urine; now we are able to let him quench his thirst as much as he pleases, so that he takes nothing which contains starch or sugar; and again, by preparing his articles of food in such a manner as to exclude the injurious ingredients, and by selecting those which are known to contain them in the smallest quantities, or not to contain them at all, we are able to present the diabetic with a fairly tempting and varied diet, so that he is able to keep to it for months and years with comparatively little difficulty. (See p. 4.)

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* See Diet for Diabetes.

In conclusion I shall venture to give you a sixth rule, which I call the "golden rule," as it relates to the carrying out of the first of our principles throughout all the difficulties involved in the rest. The "golden rule" is this:—Never let a patient become weak through a defective diet if you can prevent it by any possible contrivance; and if a patient has unavoidably become weak, never let him remain so, through any defect of diet, one hour longer than it is absolutely impossible to prevent.

Other principles and rules I must reserve for future Lectures, when treating of special cases as they come before us. But I hope that you will find, when you come to put them to the test of practice, that the few which I have given you to-day will serve both your patients and yourselves many a good turn, if you will only bear in mind what I have endeavoured to impress; that in order to carry them out satisfactorily you must keep up your knowledge of your profession generally, and especially of the various subjects which I have enumerated, as essential to a proper understanding of the alterations of diet required in disease.

DIETS FOR CONSUMPTION.

In these Diets for Consumption it is assumed that no fat is assimilated except that artificially pancreatised.

In Table I. The required amount of carbon is supplied by an excess of carbo-hydrates.

In Table II. The required amount of carbon is supplied by an excess of albuminoids.

In Table III. The amount of carbon is kept low, because it is only intended as a temporary diet to be used during periods of rest in a warm room. The arrowroot and some of the fat of the milk are pancreatised by mixture with the "pancreatic emulsion."*

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* See Appendix for mode of preparing "Pancreatic Emulsion."

DIETS FOR CONSUMPTION.—TABLE I.—CARBO-HYDRATE.

Food for 24 hours.	Oz.	Plastic.	Fat.	Saccharine.	Total Carbon.	Carbon from Nitrogenous.	Carbon from Non-Nitrogenous.
Cooked Meat	6	1·350	·534	..	1·152	0·732	0·420
Bread	10	1·000	·070	4·530	2·470	0·540	1·930
Potatoes	8	0·136	..	1·840	0·832	0·072	0·760
Sugar	2	..	..	1·800	0·848	..	0·848
Milk 20 fluid ozs.	2½	1·000	0·700	0·840	1·440	0·540	0·900
Liebig's Food for Infants	2	0·300	0·116	1·064	0·720	0·162	0·558
Farinaceous Foods	6	0·300	0·020	4·900	2·350	0·160	2·190
Fermented Liquors*	..	..	..	..	1·000	..	1·000
Pancreatic Emulsion†	2	..	1·000	..	0·740	..	0·740
TOTALS	37½	4·086	2·440	14·974	11·552	2·206	9·340
Deduct Carbon from Non-pancreatised Fats as waste	..	..	..	..	0·945	..	..
Total available Carbon	..	..	..	..	10·607	..	..

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* Either—Half a pint (Imperial) of Port, Sherry, or Marsala; Or, One Pint of Burgundy, Claret, or other similar Wine; Or, One pint of good Ale or Stout; Or, A quarter of a pint of Rum, Whisky or Brandy, diluted with one pint of water.

† See Appendix.

DIETS FOR CONSUMPTION.—TABLE II.—ALBUMINOID.

With this Diet Hydrochloric Acid and Pepsine should be given to assist in digesting the very large quantity of plastic matter.

Food for 24 hours.	Oz.	Plastic.	Fat.	Saccharine.	Total Carbon.	Carbon from Nitrogenous.	Carbon from Non-Nitrogenous.
Cooked Meat	8	1·800	·712	. .	1·536	·976	·560
Pigeon or Game	6	1·300	0·830	. .	0·830	0·740	0·090
Dried Fish	3	1·310	0·055	. .	0·745	0·710	0·035
Cheese	1	·308	0·256	·024	0·366	0·166	0·200
Vermicelli	3	1·425	. .	1·164	1·293	0·777	0·516
Bread	4	0·400	0·030	1·810	0·990	0·220	0·770
Rice or Arrowroot	6	0·300	0·020	4·900	2·350	0·160	2·190
Sugar	3	. .	. .	2·700	1·270	. .	1·270
Milk 20 fluid oz.	2½	1·000	0·700	0·848	1·440	0·540	0·900
Green Vegetables	6	0·060	0·012	0·468	0·234	0·030	0·204
Fermented Liquors*	. .	. .	. .	. .	1·000	. .	1·000
Pancreatic Emulsion†	2	. .	1·000	. .	0·740	. .	0·740
TOTALS	43½	7·903	3·615	11·906	12·794	4·319	8·475
Deduct Carbon from Non-pancreatised Fats as waste	. .	. .	. .	. .	1·410	. .	. .
Total available Carbon	. .	. .	. .	. .	11·384	. .	. .

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* Either—Half a pint (Imperial) of Port, Sherry, or Marsala; Or, One pint of Burgundy, Claret, or other similar Wine; Or, One pint of good Ale or Stout; Or, a quarter of a pint of Rum, Whisky, or Brandy, diluted with one pint of water.

† See Appendix.

DIETS FOR CONSUMPTION—TABLE III.—FLUID DIET.

	Oz.	Plastic.	Fat.	Saccharine.	Total Carbon.	Carbon from Nitrogenous.	Non-Nitrogenous.
Milk 78 fluid oz.	10	3·900	3·730	3·276	5·620	2·106	3·510
Arrowroot.	6	0·300	0·020	4·900	2·350	0·160	2·190
Pancreatic Emulsion† . .	2	. .	1·000	. .	0·740	. .	0·740
TOTALS	18	4·200	4·750	8·176	8·710	2·266	6·440

This diet is to be given as follows:—

8 ozs. of Milk and 1 oz. of Arrowroot every 4 hours (6 times in 24 hours) for 24 hours.
10 ozs. of Milk and 1 oz. of Arrowroot every 4 hours for 24 hours.
12 ozs. of Milk and 1 oz. of Arrowroot every 4 hours for 24 hours.
18 ozs. of Milk and 1 oz. of Arrowroot every 4 hours for 24 hours.

The last quantity to be continued until solid diet can be borne by the stomach.

One-third of an oz. of Pancreatic Emulsion is to be mixed with a little water, or with a portion of the milk, and given directly after each dose of Arrowroot and Milk, not mixed with the whole bulk.

† See Appendix.

TABLE IV.—DIET FOR DIABETES.

With this diet Hydrochloric Acid and Pepsine should be given to assist in digesting the very large quantity of Plastic Matter.

Food for 24 hours.	Dry Oz.	Plastic.	Fat.	Saccharine.	Total Carbon.	Carbon from		Carbon from Saccharine portion of Non-nitrogenous.
						Nitrogenous.	Non-Nitrogenous.	
Cooked Meat and Poultry	8	1·800	0·712	..	1·536	0·976	0·560	..
Cooked Pigeon or Game	6	1·380	0·110	..	0·830	0·740	0·090	..
Dried Fish (Haddock)	3	1·310	0·055	..	0·745	0·710	0·035	..
Cheese	1	0·308	0·250	·024	0·366	0·166	0·200	..
Van Abbott's Gluten Bread or Gluten Vermicelli	6	3·556	0·030	1·148	2·438	1·928	0·510	0·510 } 0·612
Green Vegetables*	3	0·030	0·006	0·234	0·117	0·015	0·120	0·102
Fermented Liquors* (Brandy or Whisky) 5 fluid ozs.	..	..	..	..	1·000	..	1·000	..
Butter (pure)	2	..	2·000	..	1·480	..	1·480	..
Pancreatic Emulsion†	1½	..	0·750	..	0·555	..	0·750	..
Eggs (2)	3	0·440	0·320	..	0·260	..	0·260	..
Bacon	3	0·250	1·880	..	1·620	0·135	1·485	..
TOTALS	36½	9·074	6·113	1·406	10·947	4·670	6·472	..
Carbon from Saccharine to be deducted as waste	..	..	..	..	0·612	..	..	..
Total Carbon available	..	..	..	..	10·335	..	..	..

Salt to taste. Water as much as required by thirst. Tea without Sugar, with a slice of lemon peel in it.

* Green vegetables permitted—Cress, Celery, Endive, Greens, Lettuce, Mustard, Spinach, Water-cress.

The following Wines may take the place of Spirits, (for equivalent quantities see Alcohol Table). Claret, **Moselle (still)**, Rhine Wine, Manzanilla, Greek (St. Elie), very dry Amontillado Sherry.

† See Appendix.

CHAPTER VIII.

DISINFECTION.

MEDIA BY WHICH THE CATCHING DISEASES ARE COMMUNICATED—MEANS FOR PREVENTING INFECTION AND CONTAGION—DIRECTIONS FOR THE SICK ROOM AND ATTENDANTS—PRECAUTIONS TO BE USED BY DOCTORS—MODE OF CLEANSING APARTMENTS AFTER ILLNESS—PROPER METHODS OF USING CHLORIDE OF LIME, CARBOLIC ACID, CONDY'S FLUID AND CHLORALUM.

Infectious and Contagious (catching) diseases—Scarlet fever, Small-pox, Measles, Typhus, Chichen-pox Relapsing fever, Puerperal fever, Whooping-cough, Mumps, &c.—are communicated principally by the following media:—

1. The breath.
2. The secretions and excretions.
    - *a.* The saliva.
    - *b.* The perspiration.
    - *c.* The urine.
    - *d.* The evacuations from the bowels.
    - *e.* The sputa.
3. The skin of the body; especially the dead peeling skin and the powdered skin which adhere to clothing and are wafted about in the air.
4. The body-clothes.
5. The bed-clothing.
6. Discharges from eruptions, abscesses, wounds, &c.
7. The hair.
8. The walls, floors, and furniture of apartments.

It is probable that no infectious or contagious disease would spread if all these media were promptly disinfected. The difficulty lies, not in disinfecting any one of them when it is specially submitted to us, for that is easily done, but in keeping up such a rigorous system of disinfection around the sick person, that *none* of these media shall escape disinfection; for common sense tells us that if only one escapes the protection from infection may be lost. It is evident that the disinfection of the secretions and excretions must be performed as they leave the body, so that the air may not be infected during their passage. For this reason the disinfectants put into spitting pots, urinals and bed pans should be *Volatile,* like Chlorine and Carbolic Acid, so that an atmosphere of the disinfectant may rise from the utensils while they are being used. I therefore, advise for these purposes Chloride of Lime and water, or Carbolic Acid, and they have the advantage of continuing to give off their disinfecting principles after the contents of the utensils are thrown down the drains.

For most other purposes Condy's fluid will suffice; it is clean, free from offensive taste or smell and not poisonous. It is not volatile but it disinfects whatever comes in contact with it. The air of a room therefore may be disinfected to a great extent by freely dispersing Condy's fluid with a spray producer. Clothes can be disinfected by being soaked in it. The skin can be disinfected by being washed with it. Sponges can be disinfected by being soaked in it, but sponges are dangerous spreaders of infection and it is much better to use pieces of cloth, which can be burnt, and in cleansing wounds to irrigate them with a syringe. Linen and other washing materials can be disinfected by boiling, but they should be previously put into Condy's fluid or diluted Carbolic Acid directly they are done with and kept in it for about two hours, otherwise they may spread infection before they are boiled. For all these purposes Carbolic Acid is most efficient but its smell is objectionable.

Whatever is not susceptible of boiling but will bear baking can be disinfected by being submitted to a temperature of from 212° to 250° in an oven, and for greater safety a little Carbolic Acid should be put into the oven at the time.

1. When a catching disease occurs in a house the first thing to be done is—to select a room for the patient as much isolated as possible from the rest of the house; a room through which no one has to pass and by which there are as few passers as possible—the top of the house is best as a rule. The room should have a window opening directly into the fresh air and an open chimney and fire-place, and it should be supplied with not less than 1000 cubic feet of fresh air every hour for each occupant whether patient or attendant. (See Chapter II). Whenever practicable a second room should be set apart near the patient's room for the attendants to cook and take meals in and to sleep in when off duty.

2. The second thing to be done is—to remove from the room or rooms selected every thing that cannot be washed, boiled, baked or burnt, and then to hang over the outside of each doorway a curtain kept constantly wet with Condy's fluid.

3. The third thing is—to decide who is to attend upon the patient. There should always be two persons and no more. They should cover their hair with washing caps, dress in washing clothes, and not associate with the rest of the household or with any other persons. They should each take at least six hours sleep out of the 24. They should each walk out in the fresh air 1 hour per day.

They should wash their hands and faces with Condy's fluid and water when they leave the patient's room. They should avoid inhaling the breath or exhalations of the patient and they should neither eat nor drink in the sick-room.

4. The fourth thing is—to place in a corner of the patient's room a large glazed pan containing water and Carbolic Acid or Condy's fluid. Into this pan everything that can be washed or boiled should be put, directly it is done with, before it leaves the sick-room. The pan should be emptied night and morning or oftener.

5. The patient should be sponged all over with warm water and Calvert's Carbolic Acid Soap twice a day (except during periods in which it may be thought unadvisable by the doctor) and if the skin is peeling or powdery it should be anointed after the sponging with olive oil containing a little Carbolic Acid (about 10 per cent.)

6. Chloride of Lime and Water or Carbolic Acid should be put into every utensil before it is used by the patient and after being used the contents should be immediately thrown down the drain together with some fresh Chloride of Lime.

7. The patient's teeth and mouth should be washed with Condy's fluid, or Calvert's Carbolic Acid Soap and water several times a day and when there is any discharge from the nose or other passages these should be cleansed in the same way. When the discharges from the body are fœtid Savory and Moore's Carbolic Acid vaporiser should be burnt in the room.

8. It must constantly be borne in mind that no amount or kind of disinfection will take the place of fresh air, and therefore the sick-room must be kept freely ventilated, carefully avoiding draughts. (See Chapter II.) Gas should not be burnt in a sick-room.

9. The doctor should not communicate with any other members of the household *after* he leaves the sick-room and he should always be provided with a basin of water, Calvert's Carbolic Acid Soap, a nail brush and a clean towel, with which to wash his hands on leaving.

Let it be especially remembered that the main points are the prompt disinfection of the infecting media, enumerated in the beginning of this Chapter, and the free circulation of fresh air.

After the acute specific disease has run its course, infection may last as long as there are any unhealthy discharges left by the disease, as long as there is any peeling or powdering of skin, shedding of hair and the like; and precautions are needed for disinfecting these means of spreading disease so long as they exist.

No doctor who has been in attendance upon Erysipelas, Scarlet fever, Puerperal fever, Typhus, Gangrene, Pyæmia, or who has been engaged in a post-mortem examination should enter *a lying-in-room* until he has subjected himself to effectual purification and disinfection; and it is a safe rule, under all circumstances, for a doctor not to touch a lying-in patient until he has washed his hands with some disinfectant.

The difficulties of carrying out this rule are very great in the hurry of practice, but every doctor engaged in Obstetric practice is bound to provide for doing so. And he should never go upon his rounds without some disinfectant with him to mix with the water in which he washes his hands in case of unexpected need.

To facilitate this important hygienic precaution I have induced Messrs Maw, the well-known instrument makers, of 11 Aldersgate Street, and Messrs Calvert the celebrated manufacturers of Carbolic Acid, to provide a little metal case containing a piece of strong Carbolic Acid

Soap, a nail-brush, (for it is useless to wash the hands without brushing out the nails) and a little tube of Carbolic Acid, for medical men to carry constantly in their pockets when on their rounds. The whole is no larger than a small snuff-box. It ought to be used by nurses and visitors upon the sick as well as by doctors.

When the infectious period of the illness is over and the patient removed from the sick-room—everything which has been used or worn by the patient and attendants having been either disinfected or destroyed as already directed—the room must be thoroughly disinfected in the following manner.

1. The windows and doors being shut, the room must be kept full of Carbolic Acid fumes for 12 hours by means of one of Savory and Moore's Vaporisers—Then the windows must be opened for 12 hours before cleaners and workpeople are admitted.

2. The floors, paint, and furniture, must be washed with Water and Chloride of Lime or with Calvert's Carbolic Acid Soap. The ceiling and walls must be Lime-washed, after which the walls may be re-papered if required. While this work, is in progress a fire should be kept burning in the grate and the windows open.

The following particulars as to the mode and proportions in which to use Chloride of Lime, Carbolic Acid, Condy's fluid, and Chloralum have been kindly furnished by Messrs Savory and Moore, and by Mr. Calvert.

For fumigation by Chlorides.—Dissolve one pound of the Chloride of Lime in 4 gallons of Water and after stirring the mixture well allow it to settle, pour off the clear liquor and place in shallow dishes or other convenient vessels in the rooms and passages of the House.

For use in chamber utensils, bed-pans, spittoons, &c., and where a volatile disinfectant is required, a wineglassful of the above solution should be added to a pint of water.

Carbolic Acid.—When required for the above purposes, that prepared *"for Disinfecting"* should be obtained—one ounce of this added to a quart of Water is sufficiently strong to purify drains, water-closets, &c. The mixture should be vigorously stirred or shaken (as Carbolic Acid is not readily miscible with water). Half a pint of this solution put into any utensil used in the sick-room will disinfect the contents and enable them to be preserved for the inspection of the medical men without any unpleasant effluvia arising.

Carbolic Acid Oil for anointing patients should consist of Olive Oil and about 10 per cent of Carbolic Acid.

Condy's fluid.—For use either with the spray producer to disinfect rooms, for cleaning sponges or bandages, washing the skin of the patient, the personal use of Nurses or Medical Attendants, dressing wounds &c., Condy's fluid should be mixed with water in the proportion of a teaspoonful to a pint. Linen and Bed-clothes should be immersed in a solution made by mixing a wineglassful in a pailful of Water; diluted in this proportion it does not stain the linen.

Chloralum.—The directions for the use of this New Disinfectant are to be found on the packages and bottles.

CHAPTER IX.

SPECIAL RECIPES, DIRECTIONS, AND APPLIANCES FOR THE SICK-ROOM.

As this does not profess to be a "cookery-book" only a few Medical-food Recipes will be here given, with some directions for the cooking and appliances of the sick-room which cannot easily be found elsewhere.—For the ordinary kitchen recipes the reader is referred to the cookery-books of Miss Acton, and Mrs. Beeton, and to Cre-fydd's "FAMILY FARE," pp. 240 to 249.

1. FARINACEOUS ARTICLES should all be submitted to a temperature of 212° Faht. (boiling water) to make them digestible.

2. BEEF TEA should not be boiled, and should not be strained through a fine sieve or muslin. It should be made as follows. Take of Rumpsteak, free from fat and minced, 1 lb, *cold* water 1 pint, a pinch of salt. Put them into a jar and tie it down. Place the jar in a saucepan of *cold* water, raise this water slowly to boiling and keep it slowly boiling for two hours. Remove the jar and strain its contents through a *very coarse* sieve so that all finely powdered sediment may run through. Then pass a piece of bread over the surface to remove any fat that may float upon it.

3. LIEBIG'S EXTRACT OF MEAT and other similar preparations. It is important to bear in mind that *these contain very little, if any, nourishment properly so called;* that is to say, they contain no plastic material, no fat, no saccharine matter. Their principal virtues belong to the class

of stimulants and blood-tonics. When mixed with water, they are excellent menstrua in which to administer nutritive materials, such as eggs, bread, oatmeal, cornflour, vermicelli; but without such additions they are quite incapable of supporting life for any length of time. Baron Leibig's own writings support this statement. Unless these facts are borne in mind a patient may easily be starved unintentionally.

4. DARBY'S FLUID MEAT. This is a new and valuable preparation. It contains all the constituents of lean meat, including fibrine, gelatine, and albumen; but by the process pursued these are all brought into a condition in which they are soluble in water and are not any longer coagulable on heating—in which state they have been designated *Peptones*. This change is effected, as in ordinary digestion, by means of pepsin and hydrochloric acid.

The Pepsin employed is very carefully prepared—without addition of starch or any extraneous substance. Lean meat, finely sliced, is digested with the pepsin in water previously acidulated with hydrochloric acid at a temperature of from 96° to 100° Fah. until the whole of the fibrine of the meat has disappeared.

The liquor is then filtered—separating small portions of fat, cartilage, or other insoluble matters—and neutralized by means of carbonate of soda; and, finally, carefully evaporated to the consistence required, namely, that of a soft extract.

The resulting extract *represents in all its constituents the lean meat employed,* but with the fibrine, albumen, and gelatine changed into their respective peptones or soluble forms. This change is effected solely by the pepsin and hydrochloric acid, or artificial gastric juice, without the evolution or absorption of any gas or the formation of any secondary products.

The peptones thus formed, although agreeing exactly in chemical composition and even in many physical properties with the substances from which they are derived, differ from them by a ready solubility in water and even in diluted alcohol.

But this process, whatever care may be taken, leaves the Fluid Meat with a strong bitter taste. This bitterness attaches always to meat digested with pepsin; and this, in the opinion of medical men, would wholly preclude its acceptance and adoption as an article of food. At the same time, it curiously illustrates the identity of the process in the laboratory with digestion in the living stomach.

In order to remove this bitter taste, and to obviate the objection to Fluid Meat on that ground, Mr. Darby made many experimental researches, and at length discovered that the purpose is completely and satisfactorily effected by the addition, in a certain part of the process, of a small proportion of fresh pancreas.

The following are methods of using Fluid Meat:—

One ounce by weight, or a large table-spoonful, equals the quantity of extract, obtained by boiling, from twenty ounces of meat.

Spread between bread and butter, and sprinkled with salt, it makes an agreeable sandwich.

Dissolved in water with a little salt and pepper it forms a liquid similar in taste to beef tea.

A small dessert-spoonful of the Fluid Meat in half a pint of water, or a tea-spoonful to a large tea-cupful is a good proportion, and this may be increased as desirable.

Flavoured with suitable condiments, Fluid Meat may be taken as soup; and, compared with the amount of solid matter obtained from meat by stewing, it becomes an economical article of diet.

For Gravy Soup.—Take a little carrot, turnip, onion, and celery, with a clove, small piece of mace and pepper; boil gently, strain, and for each half-pint of liquor add a table-spoonful of Fluid Meat, with a little salt.

For Vermicelli Soup.—Place in a covered jar in the oven a little sliced celery, onion, bruised spices and pepper, with water; when the celery and onion are thoroughly softened, strain, add Fluid Meat, (in the proportion of a table-spoonful to half a pint) with salt, a small knob of loaf sugar, and vermicelli previously boiled.

Another Soup.—Take two onions, a large carrot and turnip, cut into small slices, and fry them well with a little butter in a clean pan; when well browned, pour on three pints of boiling water; let stand till cold, skim, strain out the vegetables, add half a pound of girasole root previously boiled in water till soft, and two ounces of the Fluid Meat; boil for a minute or two; macaroni or vermicelli, softened by boiling, may be added at pleasure.

5. WHITE OF EGG differs from the yolk principally in containing no fat. On this account it is often better borne by bilious persons. Yolk of Egg contains 29·8 per cent of fat; when the stomach can bear it, therefore, it is a more complete nutriment than the white. But white of Egg beaten up *in milk* answers every purpose.

EGGS for the sick should be either raw, or very lightly boiled. They should never be given hard.

6. WHEY may be made either with Warren's sweet Essence of Rennet, or with Treacle, or with Sherry, according to circumstances.

a. Rennet Whey—see the directions on the sweet Essence of Rennet bottles.

b. Treacle Whey—pour three tablespoonfuls of best Treacle into a pint of new milk while it is boiling;

see that it boils up once after the treacle is added; set it aside to cool and then strain.

c. White Wine Whey is made in the same way as Treacle Whey, 3 glasses of sherry being used to a pint of milk.

Note—When a more nutritious food is desired and suitable, well beat up the curds with the whey instead of straining; see that they are not in lumps.

7. ALL ANIMAL FOODS are apt to lose digestibility by repeated cooking.

8. BREAD should be either toasted or 24 hours old.

9. SPECIAL RESTORATIVE. I have found the following to be a most efficient restorative food, and the mixture is agreeable to most palates.

New milk (cold) 4 parts.
Beef tea (cold) 3 parts.
Brandy (pale) 1 part.

If no other food is taken, about 5 fluid-ounces (a quarter of a pint Imperial) should be given every 2 hours, or half that quantity every hour. It should be sucked out of a *syphon* Infants-feeding bottle, not drunk out of a spoon or cup. When desirable this food may be gradually thickened by the addition of boiled corn-flour or other farinaceous articles, and one egg may be well beaten up in each half pint. The flavour may be varied by adding different spices.

10. INVALID SOUP. The following Invalid soup has proved extremely useful in a large number of cases, and since I first published the recipe in 1864 it has been usually kept nicely prepared by Mr. Donges, Confectioner, Gower Street, W.C.

Gravy beef 1 lb., scragg of mutton 1 lb., isinglass 2 oz., vermicelli 3 ozs., mushroom ketchup 3 tablespoonfuls, corns of allspice 24, sage a sprig, cold water 3 quarts;

put the isinglass and the meat cut small into the cold water, gradually boil, skim well, and then add the other ingredients; simmer four or five hours till reduced to 1 quart; strain through a fine hair sieve, and carefully remove all fat; add salt to the taste. This may be taken cold as a jelly, or warm as a soup. Calf's-foot may be used instead of isinglass when procurable—and when allowable a little *solution* of cayenne pepper should be added; and the taste may be varied by the addition of a little Worcester, or other wholesome sauce.

11. COMBINATIONS OF ALIMENTARY PRINCIPLES IN NEARLY EXACT NORMAL PROPORTIONS. (See Chapter IV).

a. Flour 4 oz., sugar 1¼ oz., suet ¾ oz., milk ¾ pint Imperial, 1 egg.—This will make a good pudding, or it may be given in any other form desired; with the addition of a little cress and salt and water it forms a complete diet, upon a sufficient quantity of which a person can live healthfully for an indefinite length of time without any other food.

b. The same may be said of the following.—Rice 3 oz., sugar 1 oz., 2 eggs, butter ½ oz., milk ¾ pint (Imperial), water as much as is sufficient to boil the rice in.

c. Suet ¼ lb., flour 1 lb., water 13 oz. These quantities when boiled yield 2 lbs. of pudding.

12. PORT WINE JELLY. Take of port wine 1 pint, isinglass 1 oz., sugar 1 oz.; put the isinglass and sugar into ¼ pint of water, warm till all is dissolved, then add the wine, strain through muslin and set to jelly. (An excellent way of giving port wine.)

13. SUET AND MILK. Put a tablespoonful of shredded beef-suet into ½ pint of fresh milk, warm it sufficiently to completely melt the suet, then skim it, pour it into a *warm* glass or cup, and drink it before it cools. If there

is any difficulty in digesting the suet add 5 gr. of Pancreatine powder. (Savory and Moore's.)

14. Milk with Rum, Brandy, or Whiskey. Put 1 tablespoonful of Rum, Brandy, or Whiskey, into half a pint of new milk, and mix well by pouring several times from one vessel to another. "Bilious" persons should heat the rum before adding it to the milk.

15. Nutritive Enemata. When nutriment is given in enemata the quantity should not exceed 2 to 4 oz., and the temperature should be about 80°.

The bowel should be first washed out with half a pint of warm water.—An elastic bottle holding the required quantity is better for nutritive enemata than the ordinary enema syringe. They should be given while the patient is lying on the back with the hips raised on a pillow.

16. Poultices. Linseed poultices should be made by filling a muslin bag with crushed linseed, (not linseed meal) then putting it into a basin or dish and pouring boiling water upon it.—When thoroughly soaked it should be squeezed between towels till no water drips from it. The same poultice may be made hot four or five times by pouring fresh boiling water upon it. Bread poultices should be made of finely crumbled bread treated in the same way as the linseed.

17. Fluids for Inhalations should have a temperature of about 170° Faht.

18. "Nash's Bronchitis Kettle" sold at 253 Oxford Street, is a new and convenient appliance for impregnating the air of a room with warm moisture either pure or medicated. Full directions for use are supplied with the kettle.

19. Warm baths should not exceed a temperature of 98° without medical orders.

20. The lights in a sick-room should always be placed

behind the patient, not in front. Gas should not be used at all. (See "Ventilation.") Candles are better than lamps.

21. A NURSING SCHEDULE should be used in all Fevers, Inflammations, Surgical Cases, and other Acute Illnesses.

Those who have been called upon to bear the responsibility of the Nursing in a severe case of Fever, Inflammation, Surgical Operation, or the like, will have a vivid recollection of the difficulties they encountered in carrying out the various Medical Orders upon the punctual attendance to which, through anxious days and nights, the patient's life depended.

How to arrange the hours for Nutriment, for Medicine, for Wine, for Brandy, for dressing wounds, for external applications, for Sleep, &c., &c., without one important item clashing with another, is often a most puzzling question, requiring the details to be carefully considered and arranged in writing, before it is practicable to work them out.

Not unfrequently the orders left by the doctor are misunderstood, or found to be impracticable when they come to be put together and arranged according to time—the hours for dressing wounds or taking Medicine clashing with those for Food, the hours for Wine coming upon those for Brandy, or interfering with the necessary sleep, and so forth. When the doctor has gone and, perhaps, as in country houses, cannot possibly be consulted again for many hours, it is difficult to overstate the distress of friends and nurses on discovering that orders, which have been impressed upon them with all the weight of questions of life and death, cannot be implicitly carried out from want of a consistent arrangement of their details.

Happily for the sick, and for the doctors, nursing is now passing into the hands of educated Ladies and well trained Nurses, competent to understand and to perform with intelligence that systematic nursing to which the enlightened practical Medicine of the present day attaches such vital importance. And the introduction of the Clinical Thermometer and similar appliances into the sick room, makes it necessary in private houses (where there are no clinical assistants or house-surgeons as in hospitals) to entrust the nurse with the task of keeping a register of the temperature, the rate of pulse and respiration, &c., at hours when the doctor cannot be in attendance.

The doctor who believes in the importance of his own orders will be strict in requiring at each visit an accurate report of how they have been obeyed. The nurse who intends to obey them faithfully will not be satisfied unless she sees that they are both intelligible and practicable before the doctor leaves the house, and *she should write them down* directly he is gone.

CHAPTER X.

ON THE GERMS AND VESTIGES OF DISEASE AND ON THE PREVENTION OF THE INVASION AND FATALITY OF DISEASE.*

"Amid all the dangers that threaten this Metropolis there is a sad certainty more serious than any one of them......it is not disease but it is not health. It is a low state of vitality, of physical power, of mental energy, of enjoyment, and even of moral strength."—TIMES, August 4th, 1858.

THE DUTIES OF MEDICAL MEN—THE INTERDEPENDENCE OF DISEASES SHEWING THE IMPORTANCE OF PERIODICAL EXAMINATIONS — ANÆMIA AND FATTY DEGENERATION AS VESTIGES OF DISEASE—ABNORMAL PHYSIOLOGICAL STATES CONDITIONS NOT RECOGNISED AS DISEASE BUT WHICH CERTAINLY ARE NOT HEALTH.

Gentlemen, we are all members of a *practical* profession. We have taken upon ourselves high and responsible duties, all culminating in action. So long as we choose to assume these duties in a profession, as yet so far from perfection, we are not justified in spending our time in scientific investigations or speculations, unless they have for their end some practical application for the good of humanity. It is the hope of attaining such an end which has led me on in the design and labour of these Lectures.

I proceed at once to lay it before you.

In the beginning of the first Lecture, I asserted, that we are justified in practising the profession of medicine only in proportion as we believe in the articles of the following creed:—

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* Selections from LECTURES delivered by THE AUTHOR at the Royal Hospital for Diseases of the Chest, in 1861.

1. That man may be the instrument through whom the invasion and progress of premature destructive changes in the human organism may be prevented or arrested.

2. That man may be the instrument through whom the damaged organism may be more efficiently repaired.

3. That man may be the instrument through whom the sufferings of the human being may be alleviated.

In what sense the organism is capable of accomplishing these ends *without* the instrumentality of man, I have shown you (in the previous lectures) by numerous arguments and examples. I have also shown you the various modes *by which it becomes deprived of this capability*. The conclusion at which I now arrive is this, that man may be the instrument through whom *the capability of accomplishing these ends may be preserved and restored to the organism.*

The manner in which man is to exercise this instrumentality is the next point for our consideration. But I think we have almost reduced it to a necessary conclusion. For as we have plainly seen that the organism is competent to take care of itself, provided that it possesses a normal Vital force and is surrounded by normal conditions of life; and as we have also seen that the great causes of defect in the force are *the vestiges of disease and abnormal conditions of life;* and as we have also learnt that the diseases, from which the vestiges result, are *invited* by defects of the force; and that, when thus invited and received into the organism, they are capable of being disposed of without leaving vestiges behind, if the Vital force is free from excessive defect; that thus these vestiges are due to defective force; and as we have learnt that the earliest invasion of defects in the force—upon which all the long and intricate succession of ills depend as a germ —as we have learnt, I say, that this state of germination exists at a period anterior to the manifestation of disease in its ordinary characters, and that it is to be found in the garb of slight impairments of the general health, the indications of which are more and more evasive and occult, the earlier the *stage of germination;* and, finally, as we have learnt that it *is in this occult and evasive stage of germination that the defect is most easily and most efficiently to be remedied;* I think you will agree with me in the practical conclusion at which I have arrived.

This conclusion is—that the manner in which man is to exercise his instrumentality for the prevention of disease, the prevention of the vestiges of disease, and the prevention of fatality in disease, is to search out these earliest evasive periods, of defect in the physiological state, and to adopt measures for their remedy.

This appears to me to be the highest, the most ennobled duty of the physician, calling for the most abstruse knowedge of the science of life, the deepest experience in disease, the keenest exercise of the perceptive faculties, the calmest, most far-sighted reasoning and the wisest judgment, —a duty as much above the management of *acute disease* as to rule an empire is above fighting a pitched battle.

Now, Gentlemen, I am perfectly convinced, from my own observation and experience in practice, that patients never think of consulting their doctors till these conditions of impaired general health have advanced far enough to have been developed into some form of disease: that thousands and thousands of persons, believing themselves to be in health, are nevertheless undergoing these early, occult, and evasive stages of defect in the physiological state; and that such persons may be considered to be in health, not only by themselves, but by any one accustomed to associate with them.

The only means by which to reach this evil and to obtain the good, would be *for persons to submit themselves and their children to systematic periodical examinations.*

Such examinations ought to include an inquiry into the family history, to learn the hereditary constitution; into the personal history, to learn all the previous diseases that have been passed through, and the habits and vicissitudes of life; into all the conditions of life surrounding the individual; into the condition of the organs and functions of the body; into the state of the secretions and fluids of the body by analyses and microscopical examinations; and so forth.

The examination should be reported in writing; and, after due consideration, such advice should be given as a careful judgment may dictate, for the future conduct, pursuits, and habits of the patient, with a view to correcting any defects or tendency to defects in the organism. Advice should also be given as to the means of removing any vestiges of disease that have been detected, or if they are not removable, advice as to the best way of overcoming their influence or of averting their increase. To this must be added precautions to be adopted in certain contingencies which, according to the judgment of the case, appear probable.

If such a plan as I have here proposed were to be faithfully and conscientiously carried out by the present and rising generation of well-educated, studious, medical men, immense benefit would be conferred *upon the public.* The next question is, then, what would be the effect *upon the profession* in a pecuniary and in an ethical sense. With regard to the pecuniary question, it is only necessary to observe that, of course, I do not expect that any man in good practice, whose time is profitably employed, could conduct such an examination and give such advice for the usual consultation-fee. A special fee would be necessary to enable him to give the necessary time and consideration to every case.

But this should in no way interfere with the power of the *poor* to participate in such a system. Every hospital and dispensary should institute a distinct department for the conduct of such examinations, and for giving the necessary advice. Every patient discharged from its wards should be submitted to this department before returning to the duties of life.*

I have again and again referred in these Lectures to the numberless anomalous symptoms, the pains, discomforts, nervous disturbances, etc., etc., which affect persons in abnormal physiological states, and which increase in their severity, obviousness, and number, as the states of health become more and more degraded, and the occurrence of some acute disease becomes more imminent. I have pointed out to you that these are the states of health which fill our consulting-rooms and the out-patient departments of hospitals and dispensaries.

In further confirmation of my statements on this point I may remind you of some apposite observations by Sir Henry Holland on the subject of symptomatic complaints. In his "*Medical Notes and Reflections*" he says, speaking of gouty blood.—" Irregular actions of the *heart, hypochondriacal depression,* as well as the more common symptoms of *dyspepsia* and *disordered secretions,* frequently antecede by months the first appearance of gout in the extremities, and occasionally give serious alarm even to those who look with medical eyes upon these ambiguous cases."—(p. 246, 3rd edition).

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* For details of the mode of carrying out the Examinations at public Charities, see a paper by the Author read at the Guildhall, June, 1862. *Transactions of the National Association for the promotion of Social Science.*

"Modern observation has led us to recognise some of these relations (of gout with local or constitutional disorders) under the names of *gouty headache, gouty ophthalmia,* and *gouty bronchitis.* My own experience would lead me to add many cases of *asthma* to the number. I have so often seen this disorder prevalent in gouty families, affecting those who do not undergo the disease in the joints, and ceasing wholly or in part when the gout appears externally, that I cannot doubt the existence of this relation.

"The greater tendency to *apoplexy* in this habit is noticed by many of the older writers, and confirmed by general experience.

"Reference has already been made to *hypochondriasis* and *hysteria;* and it is probable that other disorders of the same class, *still less generally viewed under this connection,* will hereafter be submitted to it.

"The relation of gout to the functions and disorders of *the liver* is another point of much interest in pathology, clearly attested both in the active symptoms of the disease and by those which are common under other forms of the gouty temperament. This, moreover, is one of the points associating it with that group of maladies bearing the vague name of *dyspepsia.*

"The connection of gout with *cutaneous affections* is an additional topic, yet almost unexamined; though I cannot doubt, from my own observation, that certain of these disorders occur as effects of the habit in question."—(pp. 253-54.)

The enormous quantities of medicine dispensed in the out-patient departments of hospitals and dispensaries for the *temporary relief* of this class of functional derangements and local diseases—for complaints which might be prevented by the patients themselves if they were properly informed of the causes and premonitory symptoms of their maladies—these are facts which must be perfectly familiar to all my hearers. Such a system of examination and advice as I propose, if properly carried out, must strike at the root of these evils, and would at the same time reduce the miserable over-crowding of the hospital waiting-rooms, and the enormous expenses incurred for drugs. These are considerations which, however important as elements of social and political economy, are elevated far above the rank of financial questions by the fact I have endeavoured to demonstrate in these Lectures, that *by these same means, and at the same time, we shall so largely promote the economy of life.*

I hope, Gentlemen, that you will draw the attention of the treasurers and governors of any hospitals to which you may belong to this subject. It is necessary to the credit and honour of our profession, that improvements in these medical establishments should not come from the public to us, but *should originate among ourselves,* and be urged by medical men upon the public attention.

The following sketch of a common complaint, and a common story, may illustrate the need for some such system as I propose. A lad of fifteen is admitted into a hospital ward with a first attack of rheumatic fever. He is treated with skill, and nursed with care, and in two or three weeks he is convalescent, and returns to his home without having received any damage to his heart or other organs. But he has no proper understanding of the nature of his complaint, of the conditions of life calculated to keep up the morbid influence in his organism; no clear notions of the diet which he ought or ought not to adopt; no knowledge of the premonitory symptoms by which a fresh attack of rheumatic fever is heralded, or of the precautions necessary when such an attack is feared. He has probably a general idea that his great enemy is cold, and his great friend flannel; and that is as likely to lead him wrong as right in the measures he adopts.

He goes back to his home and his pursuits apparently well. He keeps his skin closely cased in flannel, and his dwelling-rooms warm, but he neglects altogether to provide for efficient excretion by the skin. He chooses a business, either utterly regardless of its fitness for his constitution, or makes as great a mistake by selecting one in which he may be sure of warm—that is to say close—rooms and workshops by which he is deprived of exercise and oxygen. He drinks beer, eats cheese, and so forth, like other people in his position. After a few months *he comes back* as an out-patient at the hospital, with severe acid dyspepsia, and after consuming the usual amount of drugs for several weeks, gets relief, and goes back to his old habits. A few months more, and he appears again, the subject of a skin-disease; goes again through the consumption of drugs, and gets well and goes back to work. By and by he comes again with diarrhœa, and goes through the same process; at another time with gravel, and gets relief again. At length, a few years perhaps having elapsed, and after some months of depressed health, with palpitations of the heart, gloomy thoughts, irritable temper, and general *malaise*, he happens to be out on a damp raw day, gets a chill, and applies again at the hospital, with a *fresh attack of rheumatic fever.* This time he suffers from endocarditis, and after some weeks returns again to his home, "discharged cured," but with disease of the valves of his heart. He has been thoroughly well treated, and is very free from rheumatic poison, and hence goes on for a considerable time without much inconvenience; but having no clear ideas of the *nature* *of the damage he has received*, or of the precautions necessary to prevent its increase or the production of secondary diseases dependent upon this damage for their cause, he gradually becomes the subject of congested lungs and liver; of attacks of bronchitis to which he was not formerly inclined; his breathing becomes short, his old dyspeptic troubles, cutaneous affections and gravel, recur again and again, and his capability of following his former occupations gets less and less.

If he does not have another attack of rheumatic fever, he comes back to the hospital some future day with chronic bronchitis, or with apoplectic symptoms, or with congested liver, or still later with albuminuria and dropsy. At length he dies, and *his death is registered* under the head of apoplexy, heart-disease, or dropsy.

All medical men of experience will admit that this sketch is no exaggeration; that I have, in fact, omitted numerous details of minor diseases and discomforts, that are sure to have existed in the case itself. I have said nothing of the effects upon this man's children of his continued ill-health, or of the poverty and want of food brought upon his wife and family by the same cause, and *acting as fresh causes of disease in them.* But I have said enough to make it quite clear, that, in the course of a life prematurely ended, he must have consumed a vast amount of money in the form of drugs, and a vast amount of nervous energy, if not of brains, in the form of medical advice.

It is to the first causes, to the "wells and springs" of such a series of calamities as this, that I have directed your attention as fellow medical practitioners, and to which I now beg that you will direct the attention of the Treasurers and Governors of Hospitals and Dispensaries, of your private patients, and of the public at large.

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In my fourth lecture I gave an Etiological analysis of those states of disease assembled under the following six headings in the Registrar-General's Reports of the deaths in London. (Report of the deaths in London registered in the 21st week of each of the ten years 1848-57. The Report current at the time the notes for these Lectures were made.)

1. Typhus, typhoid and other forms of continued fever.
2. Apoplexy and Paralysis.
3. Heart diseases and Pericarditis.
4. Rheumatism and Gout.
5. Bronchitis.
6. Atrophy and Debility.

I demonstrated that, when we analyse the natural history of any disease, we find that the *principal factors of its essential cause, of its predisposing causes and of the causes of its fatality* fall under one of the three headings;—1. Conditions of life. 2. Coetaneous diseases. 3. Vestiges of Disease.

I showed not only theoretically but from actual observations made by others as well as by myself, how the organism becomes damaged by these VESTIGES OF DISEASE —how the vital force becomes defective through these Vestiges, how this defective state of the vital force becomes the essential cause and the predisposing cause of disease; and how the Vestiges of one disease become the causes of fatality in whole families of other diseases.

I endeavoured to prove, by an array of facts, that the vestiges of disease become causes of fatality in other diseases principally in two ways.

1. By destroying those modes of matter and that corre-

lation of conditions upon which the existence of the vital force in its normal condition depends, thus producing *excessive defect of the vital force.*

2. By producing excessive defect in the condition of some part of the organism, occupying the position, at the time, of an essential *instrument* in the processes of life, and thus causing the organism to break down at this its weakest part.

I pointed out that in the large majority of deaths from disease, *the fatality is due, not to the disease itself, but to the vestiges of some pre-existent disease, operating in one or other of the above ways.*

In illustration of this great fact, I have set forth the course of events, by which the vestiges of disease, passing under the names of ANÆMIA and FATTY DEGENERATION, become the actual causes of a large number of the deaths registered under the following names:

Tabes mesenterica, croup, measles, hydrocephalus, whooping-cough, dentition, convulsions, apoplexy, paralysis, delirium tremens, intemperance, angina pectoris, diseases of the heart, pneumonia, diarrhœa, mortification, influenza, peritonitis, childbirth, bronchitis, jaundice, liver disease, kidney disease, and some others.

As an indication of the *insidious way* in which the deadly influence is exerted by these states,—ANÆMIA and FATTY DEGENERATION—(which are only examples of a class), I called attention to the fact that their names *do not* appear in the bills of mortality. (See Anæmia, Fatty Degeneration.)

My object now is to exhibit in a conspicuous manner the INTERDEPENDENCE OF DISEASES. (See Chapter I).

I have therefore restricted myself to a statement of the influence exerted by the vestiges of each of the diseases analysed in the preceding Lectures upon the rest of the same little group, and in order that the different relationships may be seen at a glance I have arranged the facts in a tabular form.

In the following tables the first column gives a list of the vestiges of the disease at its head. The second column shows to which of the diseases already analysed each vestige may become the predisposing cause; the third column shows to which of these it may become the essential cause, and the fourth column shows to which it may become the cause of fatality. It must be remembered that several vestiges usually concur in producing their effects.

TABLES SHEWING THE INTERDEPENDENCE OF DISEASES REGISTERED UNDER THE FOLLOWING NAMES:—CONTINUED FEVER—APOPLEXY AND PARALYSIS—HEART DISEASE AND PERICARDITIS—BRONCHITIS—ATROPHY AND DEBILITY.

I. Vestiges of one or more attacks of Rheumatic Fever.	Become Predisposing Causes of	Essential Causes of	And Causes of Fatality in—
Valvular disease	Bronchitis	Apoplexy. Mechanical heart-disease	Bronchitis. Typhus. Heart-disease. Subsequent attacks of rheumatism and gout.
Pericardial effusion. Pericardial adhesions to the heart or pleura ..	.. ..	.. ..	Bronchitis. Rheumatism and gout. Typhus and heart-disease.
Pleuritic adhesions and effusions ..	.. ..	.. ..	Bronchitis. Rheumatism and gout. Typhus. Heart-disease. Atrophy and debility.
Stiffened joints	Atrophy and debility, degenerative heart-disease	Local paralysis.	
Tendency to a repetition of the attack, and of its determination to the damaged parts	A repetition of an attack of gout or rheumatic fever ..		
Anæmia	Typhus; heart-diseases, (degenerative and mechanical) .	Atrophy and debility in the subject, and in the offspring if the subject is a female ..	Paralysis. Bronchitis. Typhus Heart-disease.
Debility and nervous exhaustion, especially from repeated attacks ..	Bronchitis, rheumatic and gouty attacks. Typhus ..	Dilatation and degeneration in hypertrophy of heart ..	Rheumatism and gout. Typhus. Heart-disease. Atrophy and debility.

II. VESTIGES OF DISEASES OF THE HEART AND PERICARDIUM.	BECOME PREDISPOSING CAUSES OF	ESSENTIAL CAUSES OF	AND CAUSES OF FATALITY IN—
Constriction or insufficiency of the valves. Adhesions of the pericardium	Bronchitis. Apoplexy and Paralysis (by inclining to fibrinous clots in the circulation).	Dilatation and hypertrophy of the heart	Bronchitis. Rheumatic fever.
Tendency to degeneration after repeated inflammations	Fatty degeneration of the heart		
Hypertrophy of the heart	Fatty degeneration of the heart	.. ..	Bronchitis. Rheumatic fever.
Venous congestion of the lungs, brain, liver, and all parts in arrear of the obstruction in the heart ..	Bronchitis. Apoplexy ..	Apoplexy and paralysis ..	Bronchitis. Heart disease. Rheumatic fever. Typhus.
Tendency to inflammations, hæmorrhages, and fluxes in the organs congested	Bronchitis. Toxic heart-disease.	.. ..	Rheumatic fever. Typhus.
Obstruction to the systemic arterial circulation, secondary to the venous congestion	Bronchitis	Aggravated hypertrophy and dilatation of the heart. Apoplexy and paralysis	Apoplexy. Bronchitis. Heart-disease. Rheumatism and gout. Typhus.
Dilatation of the Heart and defect in the force of the systemic circulation	.. ..	Atrophy and debility	Heart-disease. Typhus.
Tendency to death from any subsequent disease, surgical operation or accident	Debility	.. ..	All forms of heart-disease. Rheumatism and gout. Bronchitis. Apoplexy and paralysis. Typhus.
Angina pectoris	.. ..	.. ..	Bronchitis. Heart-disease.
Diseases of the kidneys, from continued congestion. Dropsy ..	Apoplexy	Apoplexy	Heart-disease. Bronchitis. Atrophy and debility. Typhus.

III. Vestiges of Bronchitis.	Become Predisposing Causes of	Essential Causes of	And Causes of Fatality in—
Dilated bronchi	Bronchitis		Bronchitis.
Emphysema	Bronchitis. Heart-disease	Heart-disease	Bronchitis. Atrophy and debility. Heart-disease.
Hypertrophy of the heart, especially dilatation	Bronchitis		Bronchitis. Apoplexy.
Chronic bronchitis, (with or without bronchorrhœa)	Apoplexy	Heart-disease. Atrophy and debility	Heart-disease. Rheumatic fever. Atrophy and debility. Bronchitis, by exhaustion from excessive discharge, or asphyxia from accumulation of secretion.
Hepatic venous congestion (Kiernan)	Bronchitis.		
General venous congestion and deficiently oxygenated blood	Apoplexy		Typhus. Apoplexy. Subsequent attacks of bronchitis.
Thickened bronchial walls			Bronchitis.
Debility	Typhus. Rheumatism. Heart-disease.	Atrophy and debility	Bronchitis. Paralysis. Any severe disease, especially typhus and others due to a morbid poison in the blood.
Kidney-disease, secondary to other vestiges	Apoplexy. Rheumatism.	Apoplexy. Heart-disease	Heart-disease. Rheumatism and gout. Typhus. Apoplexy.

IV. VESTIGES OF ONE OR MORE ATTACKS OF GOUT.	BECOME PREDISPOSING CAUSES OF	ESSENTIAL CAUSES OF	AND CAUSES OF FATALITY IN—
Deposits of urate of soda in and about joints and some other parts.	Apoplexy	Heart-disease.	
Tendency to a return of the attack in the parts previously affected	Attack of gout.		
Anæmia and nervous exhaustion especially from repeated attacks	Bronchitis, rheumatic and gouty attacks, typhus	Atrophy and debility. Atrophy and debility in the offspring if the subject is a female	Bronchitis. Rheumatism and gout. Typhus. Heart-disease. Atrophy and debility.

V. VESTIGES OF RHEUMATISM OR GOUT, WHEN THE ESSENTIAL CAUSE HAS REMAINED LONG IN THE ORGANISM WITHOUT PRODUCING ACUTE GOUTY OR RHEUMATIC INFLAMMATION.	BECOME PREDISPOSING CAUSES OF	ESSENTIAL CAUSES OF	AND CAUSES OF FATALITY IN—
Fatty and calcareous degenerations or deposits in the heart, arteries and capillaries. Degeneration of the tissues generally	Apoplexy and paralysis. Bronchitis	Apoplexy and paralysis. Heart-disease (mechanical and degenerative). Atrophy and debility	Rheumatism and gout. Apoplexy and paralysis. Bronchitis and typhus.
Chronic disease of the kidneys	Bronchitis	Apoplexy (uræmic). Heart-disease	Paralysis. Apoplexy. Rheumatism and gout.
Stiffened and contracted joints	Degenerative heart-disease.		
Cutaneous affections	Attacks of gouty or rheumatic inflammations, when the skin disease is suppressed.		
Anæmia and other forms of debility.	Degenerative and mechanical heart-disease. Bronchitis. Rheumatic and gouty attacks. Typhus	Atrophy and debility in the subject. Atrophy and debility in the offspring if the subject is a female. Dilatation and degenerative hypertrophy of the heart	Paralysis. Bronchitis. Rheumatism and gout. Typhus. Heart-disease. Atrophy and debility.

VI. VESTIGES OF RHEUMATISM OR GOUT ACTIVE OR LATENT,	BECOME PREDISPOSING CAUSES OF	ESSENTIAL CAUSES OF	AND CAUSES OF FATALITY IN—
The rheumatic or gouty constitution *transmitted to a future generation.*	Rheumatism, gout, and heart-disease in the generation concerned	Rheumatism, gout, heart-disease and debility in the generation concerned.	

VII. VESTIGES OF TYPHUS, TYPHOID, AND OTHER FORMS OF CONTINUED FEVER.	BECOME PREDISPOSING CAUSES OF	ESSENTIAL CAUSES OF	AND CAUSES OF FATALITY IN—
Tendency to fatty degeneration ..	Debility. Degenerative heart-disease	Degenerative heart-disease, in cases of pre-existent hypertrophy	Paralysis.
Great defect in the vital force especially during protracted convalescence	Bronchitis. Attacks of rheumatic or gouty inflammation. Acute specific diseases	Atrophy and debility, Heart-disease	Bronchitis. Atrophy and debility. Rheumatism and gout. Heart-disease. Paralysis.
Increased irritability in the nervous system	Heart-disease and apoplexy, in those previously affected by other Predisposing Causes.	.. ..	.. ..
Softening of parenchymatous organs and of the tissues generally ..	.. ..	.. ..	(When affecting the brain,) apoplexy.
Tendency to extravasations of blood	Apoplexy and paralysis ..	.. ..	Heart-disease. Apoplexy. Bronchitis.
Typhoid deposits, and enlarged mesenteric glands, spleen, etc.. ..	.. ..	Atrophy and debility	Any other form of continued fever.

VIII. VESTIGES OF APOPLEXY,	BECOME PREDISPOSING CAUSES OF	ESSENTIAL CAUSES OF	AND CAUSES OF FATALITY IN—
Paralysis of sensibility or motion		Atrophy and debility, by producing fatty degeneration	Bronchitis. Heart-disease. Apoplexy.
Strong tendency to a recurrence of apoplexy in a more severe form	Apoplexy and paralysis.		
Softening of some part of the brain	Apoplexy	Paralysis	Typhus. Apoplexy.

IX. VESTIGES OF PARALYSIS,	BECOME PREDISPOSING CAUSES OF	ESSENTIAL CAUSES OF	AND CAUSES OF FATALITY IN—
Tendency to recurrence of the attack in a more severe form, or to apoplexy	Paralysis. Apoplexy.		
Tendency to mortification in the paralysed parts			Atrophy and debility. Typhus.
Softening of a portion of brain or spinal cord			Apoplexy. Typhus.
Diseases of the urinary tract			Apoplexy. Paralysis. Heart-disease.
Degeneration of the paralysed parts, or of the organism generally		Heart-disease, (degenerative).	
Tendency to death in attacks of acute or chronic disease			Typhus. Atrophy and debility. Bronchitis. Rheumatism and gout.

X. VESTIGES OF ATROPHY AND DEBILITY.	BECOME PREDISPOSING CAUSES OF	ESSENTIAL CAUSES OF	AND CAUSES OF FATALITY IN—
Rickets, in children produced while the mother is suffering from atrophy and debility	Typhus and acute specific diseases generally	Atrophy and debility	Bronchitis. Typhus.
Scrofulosis or tuberculosis, in the children produced while either parent is suffering from atrophy or debility	Paralysis (from strumous diseases of vertebræ)	Atrophy and debility	Bronchitis. Typhus.
Degeneration of tissues generally, or of those of some organ or part ..	Apoplexy and paralysis, heart-disease	Debility. Heart-disease. Apoplexy and paralysis	Apoplexy and paralysis.
Dilatation of the heart, especially in those who have made frequent ascents during atrophy and debility	Bronchitis..	Atrophy and debility from deficient circulation	Bronchitis. Typhus. Rheumatism. Apoplexy and paralysis. Heart-disease.
Fibrinous clots in the heart or vessels, which may float off	Apoplexy or paralysis	Apoplexy and paralysis (if clots float into the cerebral or spinal vessels)	Apoplexy. Heart-disease. Rheumatism. Typhus. Atrophy and debility.
Lardaceous or albuminoid deposits especially in the liver, spleen, lymphatic glands, and kidneys	Atrophy and debility	Atrophy and debility	Typhus.
Deformities in the osseous skeleton .	Atrophy and debility. Local paralysis	.. ..	Bronchitis. Heart-disease.
Arrest of development in certain muscles or other parts of the organism	.. ..	Atrophy and debility, local paralysis.	.. ..
Effusions into serous cavities, and discharges from the mucous passages	.. ..	Atrophy and debility	Bronchitis. Heart-disease. Typhus. Rheumatism and gout.
Tendency to become affected by any morbid influence to which the organism may be exposed (general predisposition to disease)	Typhus, bronchitis, heart-disease, rheumatism, and gout.	.. ..	
Tendency to death from all acute and chronic diseases, occurring during the continuance of atrophy or debility.		.. ..	Apoplexy and paralysis, bronchitis, heart-disease, typhus, rheumatism and gout. Atrophy and debility.

Having shown the remarkable interdependence which exists between different diseases—how they act and react upon one another, I must attempt in this Lecture, to show *to what extent one vestige of disease, or the several vestiges of one disease, may act as essential causes and as causes of death in other diseases.* I will first take some Diseases which have no place in the Registrar's report. This will enable us to observe how many of the headings under which deaths are registered in that report owe their existence there to diseases which *never figure at all as causes of death.*

The first example I have chosen is *Anœmia,* a name that does not appear in the Registrar's Reports.

ANÆMIA.

A careful examination of the subject teaches us that Anæmia is one of the most frequent vestiges of all severe diseases, when they do not terminate in death—the patient remains anæmic during convalescence, and in a large number of cases continues so long after returning to the duties of life. Again, we observe, that anæmia is continually occurring in connection with the periods of puberty and the cessation of the catamenia, and that during the intervening years, it is one of the most frequent forms of impaired health connected with derangements of menstruation, with lactation, with convalescence from the puerperal state, and during pregnancy.

Innumerable other causes may be found for this condition, which is, in fact, the type of most of those miserable states of health referred to by *the Times* in the memorable article already quoted—"There is a certainty worse than any occasional and precarious plague. We may anticipate it from our own experience—we may see the great fact with our own eyes. . . . . . It is not disease, but it is not health. It is a low state of vitality, of physical power, of mental energy, of enjoyment, and even of moral strength. . . . . . Shocking as it may seem, a plague once in twenty years seems but a light evil to so low a condition of humanity."

From a concatenation of circumstances, it so happens that the female portion of the population have to support the principal weight of this dire affliction. Anæmiated girls, anœmiated brides, anæmiated spinsters, anæmiated mothers, abound in the consulting room, the outpatient room, the hospital ward, the home; wherever, in fact, the physician's duties call him there they are to be found. Yet from the long list of diseases named in the mortality tables, this name, anæmia, is absent. Is it, then, a thing to be endured, but not to be feared? Is it a name for sickness only, and not *a cause of death?* Quite the reverse, gentlemen, the fact is that, like some individuals of great influence and importance, anæmia travels *incognito.* When we discover its various *"nommes de guerre,"* we are startled to find ourselves face to face with the inpersonation of long-dreaded enemies.

Tabes mesenterica .	18·3	deaths	per week.
Croup	6·8	,,	,,
Measles . . .	25·0	,,	,,
Hydrocephalus . .	32·5	,,	,,
Whooping-cough .	51·1	,,	,,
Pneumonia . . .	60·3	,,	,,
Dentition . . .	12·8	,,	,,
Diarrhœa . . .	17·5	,,	,,
Convulsions . .	36·5	,,	,,
Bronchitis . . .	64·5	,,	,,
Childbirth . . .	4·3	,,	,,
	329·6		

These are some of the names under which anæmia travels among the sick, and takes its place in the bills of mortality. The way in which it does so is as stealthy as it is deadly. I will tell you something of how it happens.

"Among the children of the poor of London, the most widely-spread of these diseases (tuberculosis, scrofulosis, rickets,) *is rickets.* It is, however, by no means limited to the poor, or to London, or even to large towns." I quote from one of the most correct medical philosophers of modern times.—(Dr., now Sir W., Jenner, LECTURES ON RICKETS, *Medical Times and Gazette.* March 17, 1860.)

"Rickets is essentially and purely a disease of nutrition, not of one part only, but of the whole body."

"Rickets causes, primarily or secondarily, more deaths than any other disease of childhood."

"The great causes of death in rickets are:—1. Intensity of the general cachexia. 2. Catarrh and bronchitis. 3. Albuminoid infiltration of organs, especially of the lymphatic glands and spleen (but also of the liver). 4. Laryngismus stridulus. 5. Chronic Hydrocephalus. 6. Convulsions. 7. Diarrhœa."

You see, gentlemen, how closely this list of the causes of death in rickets corresponds with the list I have just given of what I have called the "*nommes de guerre*" of anæmia; and the correspondence is really closer than it appears at first sight.

"The connection between rickets and *laryngismus stridulus,*" continues Sir William, "is very close. . . . . . I believe the reason of laryngismus stridulus being so constantly referred *to teething* is that the ricketty condition retards the development of the teeth, and the medical practitioner refers the laryngismus to that which, like itself, is the consequence of constitutional disease.

"If a child pass over the ninth month without teeth, you should carefully inquire into its cause. . . . . It may be, and this is infinitely the most common cause of late dentition, that the child is rickety."

Many deaths, therefore, registered under the head of DENTITION, may be referred to *rickets.*

"Catarrh and BRONCHITIS," says Sir William, "are unquestionably the most common causes of death in rickets. The softening of the ribs rendering the mechanical power by which inspiration is performed so defective, that the impediment offered to the entrance of the air by the mucus in the bronchial tubes cannot be overcome; and collapse of large portions of the lung follows.

"This want of inspiratory power, and the consequent accumulation of mucus in the bronchial tubes, affords an explanation of the extraordinary mortality of *measles, whooping cough,* and bronchitis in ricketty subjects."

Thus may we refer two more of the headings of the Registrar—MEASLES and WHOOPING COUGH—to rickets.

For similar reasons, and still more from the intensity of the general cachexia and the corresponding defect in the vital force, rickets will be found to be the true cause of fatality in many of the deaths registered under the name of PNEUMONIA.

Then we have the deaths from CHILDBIRTH 4·3 per week, and it is very interesting to trace out the influence of rickets in causing these miserable deaths. The mode of its operation is twofold. First, there is the large size of the head in the rickety fœtus; and, secondly, deformities of the pelvis in women who have been rickety in their childhood. On examining into the causes of death in childbirth, as carefully collated by Dr. R. Collins, of the Dublin lying-in hospital, I find that of eighty-one cases of death during parturition, thirty-two were due to rupture of the uterus, eleven to tedious or difficult labour. If we, then, inquire into the causes of rupture of the uterus and tedious or difficult labour, to which forty-three out of eighty-one deaths were due, we find that narrowing and deformity of the pelvis, and abnormal size of the child's head, stand prominently forward in their importance; and thus we are brought back to rickets as the chief cause of these deaths.

But you will perhaps ask, how anæmia is proved to be the cause of the deaths under these different headings, by proving that they are due to rickets? That is, in fact, the important question. The answer is this, *that anœmia in the mother produces rickets in the child, and anœmia in the child may lead to rickets also.* This may be as familiar to you all as it is to me; but I will give you the authority of Sir William Jenner again, who has devoted great attention to this subject:—

"The health of the mother has a decided influence in the developement of rickets in the offspring. . . . . Of this much, I am sure—that when the mother is in delicate health, in a state of which *anœmia and general want of power* form the prominent features, without being the subject of disease usually so-called, there the children are often in a very decided degree *rickety*, although the father is in robust health, and the hygienic conditions in which the children are placed are most favourable." "It is very common for the first two or three children to be free from any signs of rickets, and yet for every subsequent child to be rickety."

"Whatever external conditions are favourable to the formation of hydræmic blood in a child, seem to be favourable to the development of rickets.

"Albuminoid infiltration of the lymphatic glands, spleen, and other organs is by no means an uncommon cause of death in rickets. The two great features, during life, of albuminoid infiltration of these organs in a young child, are emaciation and pallor; *the anæmia* is often most remarkable."

You will not fail, then, to see at once the intimate connection between rickets and anæmia, and between anæmia and that list of terrible names in the Registrar's Reports.

I do not wish you to suppose that I attribute *all* the deaths under those headings to anæmia: that would be a great mistake. But from an elaborate and careful analysis of such deaths, I have found, and you may find, that a very large, a very remarkably large, proportion of them are due to anæmia in the individual, or to anæmia in a parent and rickets in the offspring. It is important to bear in mind, that, with the exception of hydrocephalus, the diseases I have enumerated from the mortality-tables are extremely common every-day complaints—that they occur and *terminate favourably* thousands of times every year; that it is only *the fatal cases* that come into our list, and with which we are now concerned. And what I have endeavoured to show, and what I wish to impress upon you is, that we must look to anæmia as the chief cause of this *fatality*; that it is anæmia in the individual or anæmia in a parent that brings these remediable, every-day complaints into the bills of mortality.

When, therefore, we see anæmia establishing itself, as a vestige of the diseases from which our convalescents have lately suffered, or in any other way, we must regard it as the grim harbinger of death in a vast family of diseases.

The next example I shall give is *Fatty degeneration* which like the last does not appear in the Registrar's Reports.

FATTY DEGENERATION.

In the present day, Gentlemen, we have all learnt that "something much more than a general tendency to form fat, or a general excess of fat in the blood is necessary to produce a local fatty degeneration."—(Sir James Paget's *Lectures*, Vol. I., p. 112).

Every year throws new light on the physiology of the process by which this change is brought about; but of this it is not within the province of these Lectures to treat. I wish, however, to point out to you that the pathological condition termed fatty degeneration is to be regarded as a *vestige of disease*—a vestige of perverted assimilation, either local or general, and hence a vestige also of any diseases by which such perverted assimilation is produced. In the third series of *Guy's Hospital Reports* (Vol. iii. 1857), Dr. Wilks has related a number of interesting cases of fatty degeneration, of which the only appreciable and probable causes were hæmorrhage, diarrhœa, miasmata. In these cases the subjects were comparatively young, the heart was the organ in which the diseased change was most marked, and the body generally was neither fat nor wasted.

Fatty degeneration appears to be especially prone to occur in tissues which have passed from a condition of active assimilation to one of comparatively inactive or feeble nutrition, by whatever cause this change may have been brought about. Thus, the muscular tissue is particularly subject to fatty degeneration; it is also peculiar for the vigour of its normal assimilation, and it is when this is rendered feeble that degeneration occurs. This appears to be the case whether the vigorous assimilation is hindered by arrest of function in the muscles, as in the case of paralyzed limbs, or by deficient supply of blood, as in disease of the nutrient arteries of a part, or by a depraved condition of the blood supplied to the part, as in the case of persons who, after having led active muscular lives, gradually become anæmiated by passive hæmorrhages. I have seen many instances of strong men, accustomed to vigorous country occupations, who, having become the subjects of bleeding hæmorrhoids, by which the blood lost its red globules, and nutrition became enfeebled, suffered from degeneration of their previously strong and vigorous hearts. Many other examples might be adduced of the degeneration of tissues when their assimilation is changed from a vigorous to a feeble state. Thus we find, in watching the course of diseases of the heart, that the heart which has become hypertrophied in opposing some obstruction to the circulation during the *active* life of the individual, becomes degenerated when, in the further progress of the case, the patient is forced to relinquish active pursuits, and thus ceases to call upon the hypertrophied organ for the full exercise of its muscular power. Thus, also, parts which have been inflamed are especially liable to degenerate, and fatty degeneration frequently takes place in organs deprived of their proper functions by disease, as in kidneys spoilt by Bright's disease. Thus, also, the products of inflammation, when they have no further functions to perform, are peculiarly subject to fatty degeneration. Without pressing the subject further, I think we shall all agree that fatty degeneration must be regarded as a vestige of disease, not as a disease in itself, and that in thus regarding it, we must often look beyond the defect in assimilation to the causes of that defect, in order to find the disease of which the degeneration is truly a vestige.

I must now proceed to show to what a wide extent this vestige of disease acts as a cause of those deaths classed in the Registrar's reports under the heads of a variety of diseases.

"The most interesting examples (of fatty degeneration)," says Sir James Paget, "are those of *primary degeneration of blood-vessels*. This has long been known in the *atheromatous disease*, as it was called, of the larger arteries, the true nature of which, as a fatty and calcareous degeneration of the inner and, consecutively, of the middle arterial coat, was discovered by Mr. Gulliver (see *Med. Chir. Transactions*, Vol. XXVI.) The descriptions of this complaint by him and by Rokitansky have left nothing unsaid that is yet known; but the observations are each year becoming more numerous and more interesting of similar changes in the minutest blood-vessels. Such changes are especially observable in the minutest cerebral vessels, and their importance in relation to APOPLEXY of which they seem to be the most frequent precedent, cannot be overstated." —(*Ibid.*, Vol. I. p. 139.)

Dr. Wilks' experience has taught him that, "In the majority of cases of sanguineous apoplexy, disease of the blood-vessels exists."—(*Lectures on Pathological Anatomy*, 1859.)

Dr. Kirkes has shown (*Med. Chir. Transactions*, Vol. XXXV.) that PARALYSIS, consequent upon arrested circulation in some portion of brain, is frequently the result of the obstruction of healthy cerebral arteries by masses of fibrine carried into them, after being dislodged from the valves of the left side of the heart, or from some part of the arterial system.

And Dr. Ormerod has pointed out that it is in the cachectic subjects, with feeble circulations, that such masses are likely to form in the heart, in the very persons, in fact, who are likely to be the subjects of fatty degeneration of this organ.—(*Observations on the Clinical History and*

Pathology of one form of Fatty Degeneration of the Heart, by E. L. Ormerod, M.D. *Medical Gazette,* 1849.)

And although Dr. Ormerod was not prepared at that time (1849) to consider the occurrence of fibrinous clots in the subjects of fatty degeneration to be more than a frequent coincidence, we do not now doubt that the languid circulation, and the inefficient contractions of the heart in the subjects of fatty degeneration, act, together with other circumstances, in causing these deposits of fibrine from the blood.

Describing the appearances after death in fatal cases of DELIRIUM TREMENS, Dr. Wilks says, "The body, as a rule, presents many degenerative changes, brought about by the intemperate habits. It is this alteration of the viscera, I think, to which death is owing. Delirium tremens is a recoverable affection until such changes have occurred in the tissues that improvement is no longer possible; and we then find in the body various morbid changes. These are mostly of the *fatty* kind, as all alcoholic drinks tend to this condition."—(*Ibid.*)

In ANGINA PECTORIS, again, Dr. Wilks, in common with other observers, has found that "the heart is usually fatty, and the coronary arteries ossified."—(*Ibid.*)

"It is impossible," says Dr. Ormerod (*Ibid.*), "to read any collection of cases of angina pectoris without feeling how much further fatty degeneration goes to explain the symptoms than does any other morbid change usually found on dissection."

Sir James Paget classes the heart and arteries first among the frequent seats of fatty degeneration.—(*Ibid.*, Vol. I., p. 116).

Among the vessels of which the coats have been found degenerated are those of the lungs and placenta; and pulmonary or uterine hæmorrhages may result from this state of the vessels.

Against the extreme vital depression which accompanies such diseases as PERITONITIS, INFLUENZA, and DIARRHŒA, the subjects of fatty degeneration have no resisting power; they are among the first to succumb; and thus fatty degeneration becomes a cause of death in these and other depressing diseases when they attack adults.

Out of 164 deaths from CHILDBIRTH in the Dublin Hospital, during the seven years ending November, 1826, as recorded by Dr. R. Collins, I find thirty-two attributed to rupture of the uterus, and eleven to tedious or difficult labour. Recent investigations into the causes of rupture of the uterus, show that fatty degeneration of its walls is a most frequent if not a constant coincidence.

Fatty degeneration of the uterus, then, is a cause of death in childbirth by producing or disposing to rupture of the organ; but it has yet another influence on these deaths, for we may be quite sure that a degree of degeneration must often exist, not sufficient to lead to rupture, but quite sufficient to render the organ incompetent to vigorous muscular contraction, even under the influence of unusual stimuli. And thus it may become the cause of those hopelessly tedious labours which, as we have seen, assist to swell the death-rate in parturition.

Thus do we see that among the rational causes of dread that haunt the brain of the accoucheur during a tedious labour, fatty degeneration of the uterus has a right to stand foremost.

In PNEUMONIA, Dr. Wilks says that, in "far the majority of fatal cases, some pre-existing and more chronic disease is found in some organ of the body."—(*Ibid.*)

Speaking of the probabilities of death in pneumonia, Dr. Walshe has made the following very well-considered observation:—

"There are certain other circunstances (besides treatment) beyond the control of the physician, which exercise a most indubitable influence on the issue (of pneumonia). Among these, the pre-existence of *organic disease and the state of health generally of the individual* hold an important place. But of all the collateral conditions, *age* is the most important. While at the two extremities of life, in the new-born infant and in the octogenarian, pneumonia is almost inevitably fatal, the mortality between the ages of six and twelve years scarcely exceeds two-and-a-half per cent."—(*Manual of Diseases of the Chest*, 2nd edition, p. 438.)

To this I would add, that the octogenarian may be represented at any period of life by the subject of fatty degeneration.

I need hardly remind you that, in protracted CHRONIC BRONCHITIS there is no one feature more fearfully prognostic of a fatal issue, sooner or later, than the co-existence of fatty degeneration.

In speaking of SENILE GANGRENE, Sir James Paget says it occurs, "as its name implies, in the old, and often in those who are *old in structure*, rather than in years; it affects tissues already degenerate. . . . . . I think that, in some cases, its beginning may be when the progressive degeneration of the part has arrived at death. But, if this do not happen, some injury or disease, even a trivial one, kills that which was already nearly dead, as a *severe* injury might kill any part, however actively alive."—(*Ibid.*, Vol. 1., p. 461.)

Under the heads of LIVER-DISEASE, JAUNDICE, and KIDNEY-DISEASE, I may mention some interesting cases examined by Rokitansky. *(On Fatal Steatosis—Fatty Degeneration—of the Liver and Kidneys.)*

"The cases referred to consisted in steatosis of the liver, accompanied by a high degree of steatosis of the kidneys. Their importance rests upon the possibility of proving them to be parellel to the cases of acute atrophy of the liver, and the analogous renal affection which co-exists with it.

"It is evident that in our cases we have not to deal with that steatosis of the liver which occurs so commonly in the course of consuming suppurative processes, but with *fatty livers*, as they not rarely develope themselves to a high degree, at the side of an abundant formation of fat in the areolar tissue, without the disease being always attributable to gross feeding.

"There exists thus a *steatosis of the liver*, occurring in individuals inclined to the formation of fat, to which sooner or later a *steatosis of the kidney* is added, both which diseases attain slowly and imperceptibly so high a degree that, finally, a cessation of the biliary and urinary secretion supervenes, and, after a slight degree of icterus, death rapidly sets in from anæmia and a hæmorrhagic decomposition of the blood."—(*Ranking's Abstract*, Vol. XXXI., p. 40.)

Gentlemen, I might prolong this subject much further —so widely spread is the influence of this seemingly spontaneous atrophy, this vestige of disease. I might give you quotations from reliable authorities to show in how many more diseases than I have yet referred to, the *fatality*, is determined by fatty degeneration; but I should exhaust your patience and overstep our time. I will, therefore, conclude the list by simply enumerating the causes to which death was attributed in sixty-eight cases analysed by Dr. Quain, in all of which there was fatty degeneration.—(*Med.-Chir. Transactions*, 1850.)

LIST OF CAUSES TO WHICH DEATH WAS ATTRIBUTED IN SIXTY-EIGHT CASES OF FATTY DEGENERATION.

Rupture of the heart.
Exhaustion.
Coma.
Pleuropneumonia.
Syncope anginosa.
Cardiac apoplexy.
Syncope.
Cancrum oris.
Gradual decay.
Lethargie.
Hæmorrhage into the pericardium.
Cerebral hæmorrhage.
Diarrhœa.
Gangrene of the intestines.

I must briefly remind you, in the words of Sir James Paget, that "Fatty degeneration of the heart often introduces unexpected dangers into the *ordinary practice of surgery*. It is, I believe, not rarely the cause of sudden death after operations. It is one of the conditions in which chloroform should be administered with more than ordinary caution. They who labour under it may be fit for all the ordinary events of a calm and quiet life, but they are unable to resist the storm of sickness, an accident, or an operation."—(*Ibid.*, Vol. I., p. 129.)

To sum up, Gentlemen, we have seen that this vestige of disease, fatty degeneration, may claim as its victims a certain number of deaths out of each of the following headings of the Registrar's report :—

Apoplexy . . .	26·0	deaths per week.
Paralysis . . .	23·7	„ „
Delirium tremens and intemperance . .	4·5	„ „
Angina pectoris and other diseases of the heart . . .	31·9	„ „
Pneumonia . . .	60·3	„ „
Diarrhœa . . .	17·5	„ „

Mortification	4·6	deaths	per week.
Influenza	3·1	„	„
Peritonitis	4·4	„	„
Childbirth	4·3	„	„
Bronchitis	64·5	„	„
Jaundice	2·8	„	„
Liver disease	11·0	„	„
Kidney disease	4·9	„	„
	263·5	deaths	per week;

out of which fatty degeneration claims so large a share.

ABNORMAL PHYSIOLOGICAL STATES.

We pass on, Gentlemen, to another and most important branch of our subject.

I must now speak more at length of those *states of health* to which I referred in my second Lecture, when I said that I should impress upon you that "they are intimately related to the definitely marked diseases"—those states so puzzling to the young practitioner, because they do not fall under any of the nosological headings which have been his landmarks in the study of disease—those states which, although perhaps familiar in their aspect to most old practitioners, are, nevertheless, most inefficiently treated, or not treated at all, because their interpretation is so little understood, and because their importance is not appreciated *conditions which are not recognised as disease, but which certainly are not health,* and which I propose to class under the general heading of "ABNORMAL PHYSIOLOGICAL STATES." I will gives you some examples of what I mean.

A family of four children were exposed to the infection of measles at the same time, and from the same source; all of them *were supposed to be in health at the time.* One had the measles simply and slightly; one had a severe attack of pneumonia combined with it; one indicated a disposition to typhoid symptoms, and was completely oppressed by the morbid poison; a fourth lingered in convalescence, and was found to have become the subject of a deposit of tubercles in the lungs.

A party of friends, all *apparently* in what is called health, met at a funeral; they went together into a damp unwarmed cemetery chapel on a raw winter's day, and returned together, one and all complaining that they had taken "a severe chill." They dined together and went to their homes. One suffered an attack of rheumatic fever; one had anasarca; one jaundice; another bronchitis; a fifth pneumonia; a sixth diarrhœa; a seventh had erysipelas; and another had pleurisy. One coughed up a quantity of blood; while the rest got a restless night, and a cold in the head, and thought no more about it. These are no imaginary stories; analogous cases frequently occur within the experience of medical men in large practice. But what is their interpretation? Why did the same cause—the chill—produce such different effects, under external conditions, apparently the same? No doubt, the first answer which suggests itself is, that the circumstances, so apparently the same, must have been really different. Well, Gentlemen, I will admit that, as the first step towards solving the difficulty. But I will insist that in a given case, the cause, so far as the chill is concerned, shall be the same in each individual; and the circumstances, so far as they are external, shall be the same for each individual. Nevertheless, these different effects shall be produced; and the reason we shall find to be this, that there are other causes and other circumstances, different in each case, existing *within the organisms* of the sufferers, with which *the one cause*—the chill—has to combine in producing its effect, and that the effect is the result of this combination of causes, different in each individual.

Some of you, perhaps, will say that this simply means that the different effects are explained by the different *idiosyncrasies* of the individual. And I must warn you against adopting a word as the explanation of a difficulty, lest in doing so, you fail to investigate the multitude of facts which that word may represent. I have no objection to the word, so long as you bear in mind that you must be able to explain what it means, if it is to be accepted as any explanation at all. Professor Bernard has spoken well on this subject: "I discovered," he says, "that section of large divisions of the sympathetic nerve was apparently unattended with the slightest inconvenience, *as long as the health of these animals* (rabbits) remained perfect . . . . but as soon as a general debilitation of the system arose from want of proper nourishment, acute inflammation was produced in the organs deprived of nervous influence. We had, therefore, succeeded in artificially creating particular *idiosyncracies* in these animals, and could predict with certainty that, as soon as health failed, disease would arise at a given point. Morbid predispositions must, therefore, be viewed in the light of peculiar physiological conditions." And he concludes thus: "Let me advise you not to consider idiosyncrasies in the light of mysterious powers residing within the depths of our organs, nor as entirely novel functions superadded, as it were, to those which already exist. They must be viewed as mere manifestations of the ordinary laws of physiology."—(BERNARD, *Lecture V., Medical Times and Gazet*

Health, Gentlemen, is *the normal physiological state;* and peculiarities in, or divergencies from this condition must be regarded as greater or less deviations from *health,* (abnormal physiological states) in proportion as they predispose to contingencies which increase the probabilities *of death before the normal term.*

There are very few persons who pass through life in the normal physiological state. At some period of life almost every individual diverges, more or less, from this state in one direction or another; and during that divergence, although escaping an attack of what is recognized as disease, he certainly *is not in health;* and in almost every individual there is a tendency to diverge in some particular direction, during which divergence—*i.e.,* during that period of *deranged health*—he is particularly prone to certain classes of disease. In the case I have taken as an example of the effects of chill for instance:—the man who had rheumatic fever, was already surcharged with uric acid. He who had jaundice was suffering from defective excretion by the liver, requiring only a certain increase in the defect, or of the demands upon the secreting function, to throw the secretion back into the blood. The patient who had anasarca was suffering either from hydræmia, or from defect in the excreting powers of the kidneys. The sufferer from bronchitis, I attended myself: he had chronic congestion of the bronchi, from repeated former attacks of bronchitis, and the circulation through his chest was defective, from a feeble degenerated heart; but he had been accustomed to pass as a man in health competent to perform the onerous duties of a tax-collector and county-court agent. He who had an attack of diarrhœa, found in his bile ducts or in the intestinal mucous membrane a safety valve, by which he was saved from either anasarca, jaundice, or rheumatic fever. The subjects of erysipelas and pneumonia, and the man who had hæmoptysis, were already suffering from depraved states of the blood, or of the organs to which it was determined; and from which, in the last two cases, it escaped in different quantities; while the patient who was attacked with pleurisy, was surcharged with urea from defective action of his kidneys.

These several persons, therefore, were suffering, when they considered themselves in health—before the occurrence of the chill—from *abnormal physiological states* to which we can attribute the particular form of the disease which was set up, by the addition, in each case, of one and the same cause, viz., the chill.—*But some escaped unhurt!* Because in them the physiological state was sufficiently normal that a resisting and reactionary power existed, which was competent speedily to restore the functions of the organs subjected to the shock of the chill, and to make them compensate for the temporary arrest by increased activity.

I have chosen this group of somewhat crude examples on purpose, that their meaning may be the more perspicuous. They, most of them, exemplify states of health dependent on the fluids and excretory organs of the body. It would be easy to bring many examples of degraded health consequent on disease attributable to the *nervous* system.

* * * * *

I assume, then, Gentlemen, that (in the course of these lectures) I have sufficiently demonstrated that the *vestiges of disease stand first among the causes of death.*

I have shown that so long as these vestiges exist they are causes of defect in the vital force and thus act as factors of the essential and of the predisposing causes of fresh attacks of disease.

I have shown that the diseases, from which these vestiges result, are but the manifestations of pre-existent physiological states, to which, by some means, the last condition has been supplied, necessary to complete the conditions of existence proper to the disease, which then is developed in its characteristic features.

I have shown that these ABNORMAL PHYSIOLOGICAL STATES are indicated by the various conditions of impaired, general health, "conditions not recognised as disease, but which certainly are not health."

The sum of it is this:—

1. The majority of diseases which we see excited by the various accidents of life are but the *manifestations* of pre-existent abnormal physiological states, which required only this last condition (the accident of life) to complete their development into the characteristic features of disease.

2. Those conditions "not recognised as disease, but which certainly are not health," are the faint expressions of these morbid physiological states, while still deficient in the condition necessary to complete their development into the recognised features of disease.

3. The multifarious and anomalous functional derangements which puzzle the physician, and make martyrs of the patients, depend, for the most part, upon the influence exerted by these morbid physiological states over the ordinary incidents of animal existence, which are thereby modified, coloured, and distorted.

4. During the whole of the time that the physiological conditions are disturbed, there is a greater or less defect in the vital force, and this defect, therefore, exists at a period anterior to what are usually understood as structural changes.

I have shown that these abnormal physiological states, recognisable under various forms of impaired health and attended by a legion of anomalous symptoms, may be traced back to still earlier periods in their history, when they require the greatest vigilance of the physician to detect any deviation from the standard of normal health.

Then I endeavoured to show in what direction we must look for the causes of these earliest and most occult deviations from the normal physiological state.

With this intention I pointed out that the "conditions of life" and the "vestiges of disease" have a direct influence on the vital force; that the alterations in it are transmissible to the germs of a succeeding generation; and that thus defects of force may be due to abnormal conditions of life in the individual, and to the vestiges, or vestiges of vestiges of disease in an ancestor. And I wish to draw your marked attention in this place to the fact, that it is to these *defects transmitted from an ancestor*, and to the *conditions of life in the individual*, that we must especially look for the causes of those first *insidious deviations from health*, which I have called "abnormal physiological states."

As I have shown that these incipient and insidious degradations of the vital force exist at a period anterior to such changes as are understood by the terms structural and organic, I think you will now understand why I said in my last Lecture, that there could be no fact in Medicine of greater practical importance than this. My reason was—that the very dependence upon the *conditions of life* which exposes the force in the individual to degradation under *un*favourable conditions, must render it amenable to *elevation* under the influence of conditions which are favourable. And thus we learn that there is a *possibility of cure* in states that would otherwise be beyond the reach of treatment.

APPENDIX.

I.

(*Leading Article from the* LANCET, *January* 1*st* 1870 *referred to at p.* 7.)

After a great many fluctuations, professional opinion upon the question of alcoholic stimulation in disease appears to have recently achieved some real progress towards the establishment of satisfactory principles. There are still very wide divergencies between different authorities, and we fear that there is still a good deal of extreme and irrational practice, both in the direction of excessive stimulation, and of the opposite fault of an unreasonable fear of the remedy. But it seems to us that the outlines of a greatly improved knowledge, both of the therapeutic powers, and the capacity for mischief which alcohol possesses, may now be discerned.

In the first place, as regards *acute* diseases attended with febrile phenomena, three things are tolerably plain. The first is, that alcohol when it acts well, acts as an antiphlogistic stimulant; that is to say, it lowers abnormally high temperature, it reduces the frequency of the pulse, and, while raising nervous power, it calms those disturbances of the nervous system which attend, if they are not caused by, the elevated temperature of the blood in pyrexia. The second great fact is, that there are the utmost differences between different pyrexial patients as to their capacity for receiving benefit in this way; that a large number of persons, especially among the young and previously robust, do best without any alcohol; and that among those to whom it is beneficial, there are some for whom three ounces of wine per diem is fully the physiological and therapeutical equivalent of twenty-four ounces given to another and smaller class of patients; and that nothing but careful tentative use of the remedy can tell, in any particular case, whether it is needeed, and, if so, in what quantities. In short, that all generalisations to the effect that you must, or must not, give wine by ounces, or by bottles, in fevers or in inflammations generally, are worthless and misleading. The third settled fact is this, that it is often in those cases where alcohol used (on purely theoretical grounds) to be thought most dangerous—*viz.*, in cases with very high temperature and flushed face—that it produces its best effects; and that to pour large quantities of stimulants into a fever patient simply because he is pale, and has a small pulse, is an unwarrantable proceeding.

The above are *certainties* and the following are *probabilities.*

It is probable that alcohol owes part of its influence in fevers to an antiseptic agency, by which it destroys the activity of certain bodies—call them organisms, or not, as you please—by means of which the *contagium* sets up the febrile disturbance within the blood. In the case of inflammation, it is probable that alcohol, when it acts well, does so in part because it stimulates the sympathetic and contracts the arterioles, and in part interferes with the migration of blood-corpuscles through the vascular walls, as Binz and his pupils have shown that quinine can also do. It is probable that so far as alcohol can be applied to these purposes within the organism, it is of unmixed benefit. And there is much reason to believe that the singular differences between different individuals, as to the quantity of alcohol they can bear, depend on some unexplained difference in the respective rapidity with which alcohol is oxidised in the blood in different persons. For it is now known with certainty, on the one hand, that nearly the whole, even of a poisonous dose, is always oxidised in the body, and on the other hand, that the presence of large quantities of unchanged alcohol for any length of time in the blood, inevitably poisons the nervous system. The antiseptic action, and the influence on the migrative tendency of the corpuscles, are most likely produced immediately that the alcohol mingles with the blood; it probably depends on the subsequent progress of oxidation whether the general effect on the patient will be good or bad. One thing is certain: if signs of narcotism—i.e., paralysis of the nervous system—are produced, the alcohol is doing harm and must be immediately diminished or stopped.

As regards *chronic* diseases, we are sorry to observe that there is very much less of intelligent progress in medical opinion than in the case of acute diseases. It is much to be regretted that a large number, even of highly-educated practitioners, will persist in acting on the assumption that in non-febrile diseases the amount of alcohol to be administered ought to be measured by the degree of debility, merely as such. The direct and very mischievous corollary of this is the practice, unfortunately daily increasing, of prescribing stimulants with lavish profusion in those numerous *nervous* affections to which weakly persons (more especially women) are prone. It is our duty, as medical journalists, to raise our voice to the utmost against this tendency. We are no bigots against alcohol; and we are heartily sick of the unthinking abuse which has been lavished on what it is the fashion to call "indiscriminate stimulation in acute disease." We declare our belief that the real mischief lies at the door of those who are indiscriminate (because they are unthinking and illogical) in their prescription of alcohol for *debility, merely as such.* It is no figure of speech, but the literal truth, when we say that hundreds of neuralgic, hysteric, and epileptic patients have been driven into drunkenness or lunacy, or both, by the careless folly of advisers, who had no better reason for the prescription of large doses of alcohol than the fact that these diseases are attended with nervous weakness as they undoubtedly are. The assumption involved—that so much ingested alcohol is necessarily so much added nervous strength—is so gross a fallacy that no one would assent to it if expressed in plain words. Yet we constantly see it acted upon. We repeat with all the energy of which we are capable, that it is a grave scandal and mischief that medical men should endanger in this serious way the powers of moral resistence of women and other weak persons while basing their practice upon ideas that are illogical and untenable; and we trust that a reform in this respect will immediately be commenced.

II.

FROM THE PROCEEDINGS OF THE ROYAL SOCIETY No. 120, 1870.

EXPERIMENTS ON THE EFFECTS OF ALCOHOL (ETHYL ALCOHOL) ON THE HUMAN BODY, *By* E. A. Parkes, M.D., F.R.S., *Professor of Hygiene in Army Medical School, and* Count Cyprian Wollowicz, M.D., *Assistant Surgeon, Army Medical Staff.*

As a knowledge of the physiological effects of alcohol on the human body is a matter of great importance, and as previous observations leave some points in doubt, we took the opportunity which the willingness and zeal of a very intelligent healthy soldier afforded us of investigating this subject.

In order not to lengthen the paper, we have given only our own observations, without referring to those of others.

The plan of observation was as follows:—For twenty-six days the man remained on a diet precisely similar as to food and times of meals in every respect, except that for the first eight days he took only water (in the shape of coffee, tea, and simple water); for the next six days he added to this diet rectified spirit, in such proportion that he took in divided quantities on the first day one fluid ounce (=28·4 cub. centims.) of absolute alcohol; on the second day two fluid ounces; on the third day four ounces, and on the fifth and sixth days eight ounces on each day. He then returned to water for six days, and then for three days took on each day half a bottle (=12 ounces, or 341 c. c.) of fine brandy, containing 48 per cent. of alcohol. Then for three days more he returned to water.

There were thus five periods, viz. of water-drinking, alcohol water, brandy, water.

Before commencing the experiments, the man, who had been accustomed to take one or two pints of beer daily, abstained altogether from any alcoholic liquid for ten days.

This man, F. B., is twenty-eight years of age, 5 feet 6 inches in height, and his usual weight is 134 or 136 lbs. He is finely formed, with little fat, and with largely developed powerful muscles ; he has a clean smooth skin, a clear bright eye, good teeth, and is in all respects in perfect health. He is very intelligent, and assisted us so much that we are quite certain that there has not been a mistake even for a minute in the time of taking the temperatures and passing the urine. As he had always been accustomed to smoke, we thought it proper to allow him half an ounce of tobacco daily, for fear the deprivation of it might disturb his health.

In addition to the experiments recorded in this paper, we tested the accuracy of his vision, and the muscular power before and during the use of alcohol; but as we could not detect any difference, we do not give the experiments.

Our object being to test the dietetic effects of alcohol, we gave it in small and large quantities, but avoided producing any extreme symptoms of narcotism. (Here follow in the original paper twenty-seven pages of carefully detailed experiments).

GENERAL CONCLUSIONS.

1. One and two fluid ounces (28·4 c.c. and 56·8 c.c.) of absolute alcohol given in divided quantities in 24 hours to a perfectly healthy man seemed to increase the appetite. Four fluid ounces lessened it considerably; and larger quantities almost entirely destroyed it. On the last day of alcohol the man was three quarters of an hour eating 8 ounces of bread, and could hardly do so. Had he been left to his own wishes the amount of food taken would have been much diminished.

It appears, therefore, that, *in this individual, some point near*

2 *fluid ounces of absolute alcohol* is the limit of the useful action on appetite; but it is possible that if the alcohol had been continued a smaller quantity would have lessened appetite.

In other healthy persons it may be different from the above; in most cases of disease, when digestion is weakened, it seems probable that a much smaller amount of alcohol would destroy appetite.

2. The average number of beats of the heart in 24 hours (as calculated from 8 observations made in 14 hours) during the first or water period was 106,000; in the alcoholic period it was 127,000 or about 21,000 more; and in the brandy period it was 131,000 or 25,000 more.

The highest of the daily means of the pulse observed during the first or water period was 77·5; but on this day two observations are deficient. The next highest daily mean was 77 beats.

If instead of the mean of the 8 days or 73·57 we compare the mean of this one day, *viz.*, 77 beats per minute, with the alcoholic days, so as to be sure not to overestimate the action of the alcohol, we find:—

On the 9th day, with 1 fluid ounce of alcohol, the heart beat 4,300 times more.

On the 10th day, with 2 fluid ounces, 1872 times more.

On the 11th day, with 4 fluid ounces, 12,960 times more.

On the 12th day, with 6 fluid ounces, 30,672 times more.

On the 13th day, with 8 fluid ounces, 23,904 times more.

On the 14th day, with 8 fluid ounces, 25,488 times more.

But as there was ephemeral fever on the 12th day, it is right to make a deduction, and to estimate the number of beats in that day as midway between the 11th and 13th days, or 18,432. Adopting this, the mean daily excess of beats during the alcoholic days was 14,492, or an increase of rather more than 13 per cent.

The first day of alcohol gave an excess of 4 per cent., and the last of 23 per cent., and the mean of these two gives almost the same percentage of excess as the mean of the 6 days.

Admitting that each beat of the heart was as strong during the alcoholic period as in the water period (and it was really more powerful), the heart on the last two days of alcohol was doing one-fifth more work.

Adopting the lowest estimate which has been given of the daily work done by the heart, viz. as equal to 122 tons lifted one foot, the heart during the alcoholic period did daily work in excess equal to lifting 15.8 tons one foot, and in the last two days did extra work to the amount of 24 tons lifted as far.

The period of rest for the heart was shortened, though perhaps not to such an extent as would be inferred from the number of beats; for each contraction was sooner over.

The heart on the fifth and sixth days after alcohol was left off, and apparently at the time when the last traces of alcohol were eliminated, showed in the sphygmographic tracings signs of unusual feebleness; and, perhaps in consequence of this, when the brandy quickened the heart again, the tracings show a more rapid contraction of the ventricles, but less power than in the alcoholic period. The brandy acted, in fact, on a heart whose nutrition had not been perfectly restored.

The peripheral circulation was accelerated and the vessels were enlarged; and the effect was so marked as to show that this is an important influence for good or for evil when alcohol is used.

Referring only to this healthy man, it is clear that the amount of alcohol the heart will bear without losing its healthy sphygmographic tracing is small, and it must be supposed that some disease of heart or vessels would eventually follow the overaction produced by large doses of alcohol.

3. Although large doses of alcohol lessened appetite, they did not appear to impede primary digestion, as far as this could be judged of by the sensations of the man; nor did they seem to check the normal chemical changes in the body which end in the elimination of nitrogenous excreta, of phosphoric acid, and of free acidity. In other words, we were unable to trace either the good or the evil ascribed to alcohol in this di-

rection; it neither depressed these chemical changes nor obviously increased them; it neither saved the tissues nor exhausted them; and even in the period of ephemeral fever its effects were negative.

But, of course, in these experiments we were not dealing with diseased tissues, nor with structures altered in composition by long-continued excess of alcohol. The results in such cases might be different; and it may be desirable to repeat that though appetite was lessened, the amount of food taken was the same each day.

4. Neither pure alcohol nor brandy, in the quantities given, lessened the temperature; in other words, they did not arrest the chemical changes which produce animal heat, or lessen the processes which regulate its amount, any more than they influenced nitrogenous tissue-change. Alcohol in no way influenced the rise of temperature during the attack of ephemeral fever; it neither lowered nor increased it. This appears to us conclusive against the proposal to use alcohol as a reducer of febrile heat. (See Appendix, No. 1.)

On the other hand it is not clear that alcohol increased the temperature; it produced subjective feelings of warmth in the stomach, in the face, round the loins, and over the shoulders; but at the time when these were felt (for about one hour after tolerably large doses) the thermometer in the axilla and rectum showed no rise. This is best seen by comparing the two o'clock observations, which were taken about half an hour after dinner. The feelings result from the enlargement of the vessels and the greater flow of blood through them; so, also, the ephemeral fever was decidedly not made worse by it.

5. An effect on the nervous system was not proved by any evidence of increase or decline in the amount of phosphoric acid; but there were marked subjective feelings; and possibly also the increased action of the heart was a nervous condition, as the short contractions of the ventricle were like those ascribed to alterations in the nervous currents. The feelings which were produced by four fluid ounces daily, and in a still higher

degree by the larger quantities of alcohol, proved that narcotism was produced. There was no exhilaration, but a degree of heaviness, indisposition to exertion, and loss of cheerfulness and alacrity; there was slight headache, and even some torpor and sleepiness. All these effects were more marked with brandy. The commencement of narcotism was therefore produced in this man by some quantity much less than 4 fluid ounces, and probably nearer 2. It was nearly this amount which also commenced to destroy the appetite; and it may also be observed that a considerable rise in the frequency of the pulse occurred on the third day of alcohol, when 4 ounces were taken, whereas on the days with one or two ounces the pulse, though quickened, was so in a much less degree.

Putting therefore these points together, viz. that the obvious effect on the nervous system (*i.e.* narcotism), the loss of appetite, and a great rise in the quickness and frequency of the heart's beats occurred at the same time, it seems fair to conclude that there must be a relation between the phenomena, or, in other words, that all were owing to nervous implication.

It appears, then, clear that any quantity over two ounces of absolute alcohol daily would certainly do harm to this man; but whether this, or even a smaller quantity, might not be hurtful if it were continued day after day, the experiments do not show. It is quite obvious that alcohol is not necessary for him; that is, that every function was perfectly performed without alcohol, and that even one ounce in twenty-four hours produced a decided effect on his heart, which was not necessary for his health, and perhaps, if the effect continued, would eventually lead to alterations in circulation, and to degeneration of tissues. It is not difficult to say what would be excess for him; but it is not easy to decide what would be moderation; it is only certain that it would be *something under two fluid ounces of absolute alcohol in twenty-four hours.*

It will be seen that the general result of our experiments is to confirm the opinions held by physicians as to what must be the indications of alcohol both in health and disease. The effects on appetite and on circulation are the practical points to seize; and if we are correct in our inferences, the commencement of narcotism marks the point when both appetite and circulation will begin to be damaged. As to the metamorphosis of nitrogenous tissues or to animal heat, it seems improbable that alcohol in quantities that can be properly used in diet has any effect; it appears to us unlikely (in the face of the chemical results) that it can enable the body to perform more work on less food, though by quickening a failing heart it may enable work to be done which otherwise could not be so. It may then act like the spur in the side of a horse, eliciting force, though not supplying it.

The employment of alcohol in health and disease is so great a subject that we should have felt tempted to extend these remarks to some points of medical practice, had it been desirable to do so in this place. We will only say that while we recognize in these experiments the great practical use of alcohol in rousing a failing appetite, exciting a feeble heart, and accelerating a languid capillary circulation, we have been strongly impressed with the necessity for great moderation and caution. In spite of our previous experience in the use of alcohol and brandy, we were hardly prepared for the ease with which appetite may be destroyed, the heart unduly excited, and the capillary circulation improperly increased. Considering its daily and almost universal use, there is no agent which seems to us to require more caution and more skill to obtain the good and to avoid the evil which its use entails.

We wish to guard ourselves against the supposition that in speaking of alcohol and brandy we refer at all to wine and beer, which contain substances in addition to alcohol, which may make their action in nutrition somewhat different.

FROM THE PROCEEDINGS OF THE ROYAL SOCIETY, No. 123, 1870.

In the Proceedings of the Royal Society (No. 120) is an account of some experiments with pure alcohol and brandy on a healthy man. This paper is intended as a continuation, with the substitution in the experiments of red Bordeaux wine (claret) for alcohol and brandy. The same man was the subject of the experiments, and he was placed on precisely the same diet as is recorded in the former paper.

The experiments were continued for 30 days, the man having abstained from any alcoholic beverage for 16 days previously. During the first 10 days, water only was taken at dinner, during the next 10 days red Bordeaux wine was substituted for the water; 10 fluid ounces (284 cub. centims.) being given on the first 5 days, and 20 fluid ounces (568 cub. centims.) on the last 5 days. The wine was taken at dinner time, at a quarter past 1 o'clock. In the last 10 days water was again given.

The wine was a good claret, as it was thought best to use a superior wine; it was Haut Brion wine of second growth, of the vintage of 1863, and was sold in London at the price of 60*s.* per dozen. It contained 11 per cent. of alcohol. The free acidity was equal to about 3 grains per ounce of tartaric acid ($C_4H^6O^6$); the total solids amounted to 21·76 grammes, and the fire-proof salts to 2·359 grammes per litre. Of this amount of salts 2·027 grammes were soluble, and ·332 insoluble. In the former, phosphoric acid and chlorine were present in the amounts ·145 and ·106 gramme per litre respectively; the insoluble salts contained only ·0175 gramme of phosphoric acid per litre. In the 10 ounces of wine there were therefore only 0·7 grain of phosphoric acid, and 0·46 grain of chlorine.

The ash was intensely alkaline, and, when neutralized with standard acid, the alkalinity was found to be equal to 1·679 grammes of tartaric acid ($C_4H_6O_6$) per litre.

Only two circumstances (except the taking of wine) were different in this set of experiments as compared with the former.

The first experiments were made in February and March, 1870, when the weather was very cold; the present were made in May and June in very hot and dry weather. The only influence we could trace to this altered condition of climate was that the amount of water allowed was insufficient, and the man suffered some discomfort from thirst. We could not perceive that any effect was produced on the nitrogenous elimination; certainly there was no diminution.

The other alteration was that the man had gained 4 lbs. in weight, and was still gaining a little when the experiments were commenced; he continued to do so slowly until the 24th day, when his health began to give way and he lost weight.

The experiments included the number of the pulse (taken in the recumbent position) every 2 hours from 8 A.M. to 10 P.M., tracings of the pulse and respirations, the temperature of the axilla every 2 hours from 6 A.M. to 10 P.M., the temperature of the rectum four times a day (the observations being taken with the same thermometers as on the former occasion), the amounts of nitrogen, phosphoric acid, chlorine and free acidity of the urine, and the weight, and in the two cases the amount of nitrogen in the stools. (Here follow in the original paper fourteen pages of carefully detailed experiments).

GENERAL CONCLUSIONS.

1. The general results of these experiments are in all respects identical with the experiments on alcohol and brandy, that is to say, there was a marked effect on the heart, coinciding tolerably well in amount with the effect produced by pure alcohol in the former experiments; there was no unequivocal alteration of temperature in the axilla or rectum, no alteration in the elimination of nitrogen, for the increase in the last period cannot be credited to the direct effect of the wine; no alteration in the phosphoric acid of the urine; some augmentation of the free acidity of the urine; no alteration of the alvine discharges. In other words, claret-wine in the above quantities cannot so far be distinguished in its effect from pure alcohol. Its most marked effect, the increase of the heart's action, must be ascribed to the alcohol, in great measure, though the ethers may play some slight part.

But it would be going too far to assert that the dietetic effects of red Bordeaux wine and of dilute alcohol are identical. The difference between them must probably be sought in their effects on primary digestion and assimilation, delicate and subtle influences which experiments like those recorded in the paper do not touch. The influence of the sugar, of the salts, and of the acidity must also be appreciated by other methods. The man himself affirmed that the wine agreed with him better than the alcohol or brandy, but the large quantity he took of these last fluids vitiates the comparison.

These experiments on wine enabled us to define somewhat better than the previous trials what might be considered moderation for this man. *The* 10 *ounces of wine, containing about* 1 *fluid ounce of pure alcohol,* did not cause the least unpleasant feeling of heat or flushing. The 20 ounces (containing almost 2 fluid ounces of alcohol) were manifestly too much. He felt hot and uncomfortable, was flushed, the face was somewhat congested, and he was a little drowsy. Moreover, as already mentioned, alcohol then began to appear in the urine. Therefore he ought certainly not to take much more than 1 fluid ounce of absolute alcohol in 24 hours.

With regard to the propriety of this healthy man taking any alcohol, we have no hesitation in saying he would be better without it. His heart naturally acts quickly and strongly enough; alcohol increases its action too much, and might lead on to alteration in its condition, or to injury of vessels, if any degeneration were to take place in them. This man had gone through the Abyssinian campaign, and stated that when the force was without rum, owing to deficiency of transport beyond Antalo, he had in no way felt the want of the stimulant, though some of his comrades did. This seems to confirm our opinion, that alcohol for him is not a necessity, and indeed is not desirable.

III.

Letter by the Author ON LONDON NOISE AND LONDON SLEEP, *published in the Times, August 13th,* 1869.

TO THE EDITOR OF THE TIMES.

Sir,—The London season is over once more, and everyone is hurrying to get a dash of sea water or of mountain air, before returning to London work. Brain-fag, nervous exhaustion, and worry are the universal complaints; and who can wonder at it? For where and when in this great city I should like to be told, can anyone secure six hours of undisturbed sleep?

If insanity increases, if doctors are more busy every year with diseases of the nervous system, if men and women wear out faster and faster, who can wonder, if he will take the trouble to consider how utterly our municipal arrangements ignore the necessity for sleep?

It is time, indeed, that we turned our attention to this vital question, upon which hangs not only the comfort and happiness of our best men and women of the day, but the actual value of their mental work, the continued sanity of their minds, and the mental calibre of their progeny. I am not the only member of my profession who has long desired to bring this matter into public notice; far otherwise. Your columns might easily be filled day by day with the sore experiences of medical men on this point. But I see the evil increasing year by year, and I cannot longer keep silent when I see "holiday tasks" set to thinking men, to rob them of the only chance they had left of recreation and rest.

If some of us are to be doomed to spend the recess in digesting education Bills, and in speculations on the value of clipped sovereigns, at least let some others of us consider the value of a little sleep.

This is a very simple question, and the evil appears to be susceptible of a simple remedy. It is a question of police; and attention being once prominently called to its importance there can be no excuse for its being longer neglected. The police should be made to keep our streets quiet during certain hours of the night. No attempt at this is made at present. The night policemen walk tacitly up and down, while every house in a street is being roused by the most abominable noises, without making the slightest attempt at checking them. It might not unfairly be asked that people should have a chance of sleeping from 12 o'clock till 8; but in the name of all that is sane, let then have the possibilitv of sleeping from 2 o'clock till 8.

There is no such chance now. No one interferes to stop any amount of noise in the night and early morning. A party of cats may hold an uproarious concert in the middle of the road without even a "hiss" from the policeman to disperse them. Two "cabbies" may career down the opposite gutters, and hold a conversation across the road at the top of their voices. A train of scavengers' carts may be driven down the streets, rumbling like thunder, while the driver in the last cart holloas his jokes to the man in the front. In some districts it is thought necessary to create the most infernal noise about 5 o'clock in the morning by setting a host of garrulous old men to scrape and stone the roads at that pleasant hour. On Sunday mornings the paper boys are allowed to bawl with all their might. At any hour of the night, a fool in love with a concertina may disturb a whole neighbourhood with the noise he pleases to think music; and no interruption is given to any number of drunken rollickers who choose to sing and holloa up and down our streets and squares. I have said nothing of the early organ-grinders, collectors of hares' and rabbits' skins, sellers of water-cresses, the inevitable dustman, the rows attendant upon balls and receptions, or a hundred other sleep preventers, too painfully familiar to those who turn into their beds between 12 and 3 o'clock in the morning, their brains fagged and excited by work—parliamentary, scientific, judicial, professional, it matters not which, or even by those unavoidable and wearying pursuits of social life which we call "society." Of the sick I dare not even speak, for to them this everlasting noise is simply murder. But for those in ordinary health, for those who are doing the brainwork of the nation, I ask for some chance of at least six hours quiet sleep out of 24. Even this moderate allowance might suffice to restore the wear and tear of the day and refresh the spirits for the ever recurring fight. But such sleep is utterly impossible, as a rule, in the present state of things, and hence the yearly increasing decay of mental and nervous health.

It needs but your aid, Sir, to procure a remedy. With proper police regulations the noisiest place in London can be kept comparatively quiet, as the citizens have shown in the main thoroughfare through their new meat market in Smithfield. There a couple of policemen, properly instructed, stop all unpleasant noise. I trust, then, that before London assembles again for work some steps may have been taken to give us quiet streets for at least six hours out of the twenty-four.

I am, Sir, yours truly,
M.D.

Harley-street. Aug. 11th, 1869.

LEADER FROM THE "TIMES" *August* 17*th*, 1869, *referring to the above letter.*

"Our correspondent 'M.D.' may we think, claim the credit of having suggested, or at least drawn public attention to, a new remedy for a very old and common complaint. The complaint cannot, indeed, be altogether got rid of without revolutionizing our whole system of modern life, for it simply amounts to this—that men now-a-days work so hard, and live in such a constant whirl of excitement, that neither body nor mind gets sufficient recreation or rest. The mind is naturally the greater sufferer, for the obvious reason that it may be kept almost incessantly in harness, and may be working its very hardest, while the body, comfortably stretched on bed or sofa, is enjoying luxurious repose. It is scarcely too much to say, for instance, that men of anxious temperament engaged in commercial speculations during critical times do not, from the moment they open their eyes in the morning to the moment they close them at night, know what it is to have ten minutes altogether free from absorbing calculations how to avoid this possible piece of bad luck, or turn good luck to the best advantage. Even when they try to banish these exciting topics—an effort, however, which over-anxious minds seldom make very strenuously—their brain, nevertheless, will sometimes work in spite of them. And what happens to them happens, if in less degree, to nearly all who have to win their bread in professions and occupations where competition is keen. Hence it is, as 'M. D.' points out, that we see what are vaguely called 'nervous complaints' steadily on the increase, often leading, if they are not at once taken vigorously in hand, to confirmed ill-health, and sometimes even to insanity. 'It is time,' he declares 'that we turned our attention to this vital question, upon which hang not only the comfort and happiness of our best men and women of the day, but the actual value of their mental work, the continued sanity of their minds, and the mental calibre of their offspring."

" We are afraid that nothing short of a miracle could provide a complete remedy for the evil of which our correspondent complains. We should require a second JOSHUA to bid modern civilization stand still or change its course. There are indeed philosophers who look hopefully forward to the time when men will be content to do just enough work to supply them with the means of gratifying their proper mental and bodily wants—when they will not be for ever jostling and struggling with each other in the arduous race for power and wealth. The philosophers may, for aught we know, be right, and it at least gratifies the benevolent instincts to picture our over-worked world some day settling down by universal consent into a blessed state of repose. But certainly there are at present no signs of this coming millennium. The nineteenth century notion of 'enough' means 'always a little more.' Thus A may have plenty to eat and drink of the best, a comfortable house, a charming wife and family, a large balance at his banker's to spend in the most pleasurable ways prompted by a cultivated taste—may, in short, have all that the philosophers consider essential to human happiness; but all this avails nothing to keep A quiet while B remains a yard ahead of him in the race of life, and no sooner is B distanced than he becomes equally solicitous about C. Nor is this always A's own fault, if fault it is to be considered, or his deliberate choice. He cannot stand still if he would, since to remain stationary where everybody else is moving on is to loose ground which cannot, perhaps, be made good. The successful merchant or professional man toils in his office all day, and then goes home late at night too tired and worn out to enjoy the home comforts and luxuries with which his wealth has enabled him to surround himself. If you tell him that he is throwing all his opportunities away, that he might as well be a poor man without these advantages as rich without time for enjoying them, and that he would be wiser to content himself with doing two-thirds of his present work for two-thirds of his present pay, he will probably reply that he gladly would do this if he could, but that he has no choice. He cannot do just as much work as he likes, and leave the rest undone, without danger of losing his position altogether. In the general rush of eager competitors from all quarters, he must go ahead with the crowd, or risk being left far behind and perhaps trodden down by it. When a man has attained so secure a position that he can please himself about taking or rejecting work, it usually either is time that he should retire upon his laurels, or else, if his health is good, long habit has made constant work such a second nature that he cannot get on without it. We are afraid that, until the promised millennium provides some substitute for the keen spirit of competition, as understood and practised in the nineteenth century, there is no hope of escaping altogether from the growing evils of over-work, since every new invention which diminishes space and time, or otherwise multiplies facilities for communication between man and man, only supplies fresh materials for the competitive spirit to work upon."

"However, that we cannot effectually remedy the evils of over-work, and that it is steadily on the increase, are only additional reasons for adopting what partial remedies we can find; and 'M.D.' has at least one to suggest well worth public consideration. The best cure for over-work is obviously rest, and the best kind of rest is sound sleep at night. The first question usually that the doctor asks a patient suffering from 'nervous exhaustion,' 'worry' or 'brain-fag' is whether he sleeps well, and, if the answer is in the negative, every plan is tried to secure him, that surest and safest of all restoratives, a sound night's rest. Yet in London, as 'M.D.' bitterly complains—and the complaint is repeated by other correspondents, whose letters we publish to-day—in which, as the busiest centre of industrial and social life, the wear and tear of over-work is greatest, and the need for the best kind of rest proportionately pressing, no attention whatever is paid to procuring quiet nights. Anybody and everybody is allowed, without let or hindrance, to make night hideous by whatever discordant sounds may suit his jovial or fantastic mood, his pleasure in the performance being probably enhanced by the thought that he is disturbing all the commonplace, prosaic people who have tamely slunk off to bed instead of 'enjoying life' as he does. Our correspondent, 'M.D.' graphically described with the indignant energy apparently of a victim, the various nocturnal noises which in London murder sleep. It is not necessary here to re-enumerate them, or to say more about them than that they nearly all—certainly all the most objectionable—might be, if not altogether stopped, at least kept within less troublesome limits by the police. The police, for instance, cannot prevent cabs from remaining in or driving about the streets all night, but they can prevent the cabmen from carrying on a conversation in Stentorian tones with each other or the watermen or any late reveller who provokes them to a wordy war; and although the reveller himself cannot be kept from wandering all night about London, he may at least be kept quiet without any unwarrantable infringement upon the liberties of the British subject, and it is to revellers that much of the nightly disturbance in town is due. Besides, the interference of the police, independently of its immediate and special effects, would generally exercise a beneficial influence by directing public attention to a question which, notwithstanding its vital importance, is now strangely neglected. Unless a law is so unpopular that people deliberately rebel against it, its natural tendency is to educate the public mind into a spontaneous appreciation of the practice it enjoins. Many Londoners, otherwise harmless and well-disposed enough, are often noisy at night simply because the duty of keeping quiet and allowing their neighbours to sleep undisturbed has never been fairly brought home to them. But if the violation of this duty came to be recognised as an offence, not merely in theory, but in practice, rendering the offender liable to be locked up some hours in a police-cell and punished next morning by a magistrate, the duty itself would acquire its proper importance in the eyes of all respectable law-regarding people. Nor would the indirect effects of police interference cease, we think, here. In various other ways attention would be drawn to the necessity of securing quiet nights in London. Streets would be paved, houses and windows be constructed, and even bedrooms chosen with much greater regard than at present to this point if its importance were more generally recognised—if, in fact, it became one of the standing sanitary arrangements of the metropolis. Now, although a vast number of Londoners suffer sadly from want of sleep at night, they have learnt by long habit to look upon it as a necessary evil, inseparable from London life. They bear with it, because their only notion of escaping from it is to rush off to some quiet place in the country where there are no night cabmen or drunken revellers, and by most Londoners the remedy would probably be considered worse than the disease. Yet, for all this, they do not at all relish the disease, but would gladly be rid of it, and if the police will take the matter up and endeavour gradually and judiciously, by making a few well-chosen examples, to protect the streets of London and other large towns from needless disturbance between, say, midnight and 6 or 7 o'clock in the morning, we are quite sure they will receive the thanks of the community, and may rely on public support."

V.

Abstract of a Lecture on " DUST AND DISEASE, *delivered at the Royal Institution.*" (*From The British Medical Journal, January 29th*, 1870.

" PROFESSOR TYNDALL, in making some experiments on vapours, wished for a current of air quite free from the particles of dust always seen in a beam of sunlight. He tried various means for this purpose; one consisted in passing air through a tube filled with sulphuric acid; another, in passing the air through a tube filled with solution of potash. In each case, particles, capable of refracting light, and rendering themselves visible, were still present. In October, 1868 he hit on the plan of allowing the air to pass over the flame of a spirit-lamp. 'The floating matter no longer appeared, having been burnt up by the flame. It was, therefore, organic matter. If the air were sent too rapidly through the flame, a fine blue cloud was noticed. This was the smoke of the organic particles.' The Professor was not prepared for the discovery that the dust of our air was organic. He had always considered it inorganic and non-combustible. M. Valentin now furnished him with a small gas furnace with a platinum tube, which could be heated to redness. Air was passed through this tube when cold, and then when hot. When combustion was perfect, no particles could be detected."

"Further experiments led to still more interesting results. A beam of light was made to illumine the dust of the laboratory, and the flame of the spirit-lamp allowed to play on it. Wreaths of darkness were at once seen to mingle with the flame, just like intensely black smoke. 'When the flame was placed below the beam of light, the same dark masses steamed upwards.' They were at times blacker than the blackest smoke. A red-hot poker placed under the beam produced the same dark wreaths. A large hydrogen flame led to the same result. Smoke was therefore out of the question. What, then, was the blackness? Simply that of stellar space resulting from the absence, from the track of the beam, of all matter capable of scattering its light."

"The Professor then remarked: 'Nobody could, without repugnance in the first instance, place the mouth at the illuminated focus of the electric beam and inhale the dirt revealed there. Nor is the disgust abolished by the reflection that, although we do not see the nastiness, we are churning it in our lungs every hour and minute of our lives.' The wonder is, that so small a portion of this dirt should appear to be really deadly to man. What is this portion?"

"The lecturer then alluded to the notion, at one time prevalent, that malarious diseases were due to organic matter in a state of decay (fermentation). It was then shown that fermentation really depended on the growth of the yeast-plant. Further, Schwann, in 1837, showed that meat, in contact with air which had been heated, did not putrefy; and he affirmed that putrefaction was caused by something derived from the air, which could be destroyed by high temperature. The germ-theory of epidemic disease soon followed, and found an energetic supporter in Sir Henry Holland, the present President of the Royal Institution. The spread of cholera and that of small-pox were adduced as instances in support of the germ-theory."

"Professor Tyndall alluded to the difficulty that must be experienced in freeing surgical instruments (a canula, for instance) from the means of carrying contagion, in the presence of an atmosphere such as ours, unless a high temperature were employed, and this is not done. Thus, notwithstanding all the surgeon's care, inflammation often sets in after the use of such an instrument. When an abscess has been tapped, the pus, which was at first sweet, becomes fœtid and swarms with vibrios. Professor Lister's views were quoted."

"The Professor then said the dust could not be blown away with a pair of bellows; but, if the muzzle of the bellows were stuffed with cotton-wool, it was found that the air which escaped was free from particles. Schrœder used cotton-wool as a filter in his experiments on spontaneous generation; and subsequently it was used in those of Pasteur. Since 1868 Dr. Tyndall has used it himself."

"The most interesting and important illustration of such a filtering process is furnished by the human breath. After inspiring a quantity of common air, a long expiration is made through a glass tube across the electric beam. At first the luminous track is uninterrupted. The breath impresses on the floating matter a transverse motion, but the dust from the lungs makes good the particles displaced. After a time, however, an obscure disc appears upon the beam, and, at the end of expiration, the beam is, as it were, pierced by an intensely black hole, in which no particles whatever can be discerned. The air, in fact, has lodged its dirt in the lungs. A handful of cotton-wool placed over the nose and mouth during inspiration makes the dark-hole in the beam of light appear from the beginning of expiration. A silk handkerchief answers nearly as well, but the filtration is not nearly so perfect as with cotton-wool."

"In conclusion, the use of cotton-wool respirators was strongly advocated."

VI.

Letter from the Author published during the prevalence of Typhus Fever im the Metropolis, to call attention to the mischief which may accrue from neglecting even one of the essentials of a Normal diet.

BREAD DIET AND TYPHUS FEVER.

TO THE EDITOR OF "THE DAILY TELEGRAPH."

Sir,—The folly of the man who built his house upon the sands is familiar to all the world; but there is a parable of a folly even greater than his. A people, knowing that a tempest was approaching, left out the mortar and the girders from the houses they were building, and when the tempest came, and the winds blew upon the houses, they crumbled to pieces before the storm.

It will hardly be believed that such an act as this is being performed, at the present hour, in the most enlightened city of Christendom, under the eyes of scientific and learned men, in the purest innocence and good faith, and in the name of charity. Yet such is the plain truth.

Typhus fever has made its appearance in the houses of the half-starved poor of this metropolis. It is a contageous disease, but requires a particular soil to insure its fructification. Hence, out of any number of persons exposed to its poison, those suffer from the disease whose bodies present the most appropriate soil, and it proves especially fatal to those who are most strongly predisposed to its attack. It is well known to pathologists that in those who die of typhus all the tissues of the body, and the blood itself, are found to have lost their plasticity. Loss of plasticity in the body, and general want of vital force, constitute the characteristics of the soil in which the seed of typhus is sure to fructify. It would seem, then, but the most obvious common sense, that wherever the seed of typhus is known to be lurking every possible effort should be made to secure that it shall find no appropriate soil—that no human bodies deficient in plasticity shall be at hand. Yet what is the real state of the case? Typhus fever follows in the track of want. It fixes on some household where the effects of want are rife—*i.e.* where the inmates are reduced to the last extreme of poverty, and as a consequence are depending upon parish relief. Such a household is almost sure to be closely associated with others of the same class—depending upon parish relief. This parish relief means bread.

The seed of typhus, then, is scattered amongst a community subsisting upon bread. Now the houses in the parable, built up without mortar or girders, are the analogues of the human bodies built up out of bread. They have lost plasticity, and when the seed of typhus falls upon them, it takes root and fructifies, and they crumble to pieces before the storm of sickness. It is hardly possible to maintain the body in health upon bread alone. A long study of the composition of food, in relation to health, warrants me in making this assertion; and I feel bound, in the cause of humanity, to call attention to this fact at the present moment, when the winter is at hand, and the poor of this city are threatened with such a scourge as typhus fever.

No food can maintain health in an adult, unless the average allowance for twenty-four hours yields to analysis from 3 to 4 oz. of plastic material, from 2 to 3 oz. of fat, and from 8 to 10 oz. of saccharine material. (See Essentials of a Normal Diet). Compare this with the composition of bread. At least 32 oz. of bread must not only be eaten but assimilated in order to obtain 3 oz. of plastic material, the smallest amount which can be accepted as necessary to supply the daily waste of tissue. This assimilation cannot take place without a certain proportion of fat, which fat is not supplied in the necessary quantity by the bread, and no other source of supply is provided by the parish relief. It thus becomes evident that all those poor creatures who are entirely dependent upon bread for their existence are specially prepared for the reception of typhus, and not less specially prepared for its fatal issue.

Setting every other consideration aside, then, and taking simply the ground of economy, it is a frightful extravagance of the funds of a parish, not less than of its life, to issue rations of bread only to the inhabitants of districts where typhus fever is rife. Immediately a patient is stricken with typhus the medical officer must call for wine, brandy, beef-tea, and the like, to the consternation of the board of guardians; and after all this there will probably come at last the expense of burial. So that every case of typhus is a drain on the parish funds far greater than would have been made by supplying the extra food necessary to prevent it. If then the spread of typhus is to be checked, instead of encouraged—if it is to be rendered less fatal when it occurs, instead of more fatal—rations containing the proper elements of nutrition in their proper proportions and quantities must be secured to every member of a family in which one individual is affected with typhus, and also to all those persons who are associated with the infected household.

There is considerable difficulty in selecting diets for the very poor, which combine cheapness and simplicity with the essential chemical composition and a form which the stomach will tolerate. But the two following will be found to fulfil all these conditions, so far as it is possible to do so without the introduction of meat; and in one of them bread is given in the largest quantity consistent with health:—

1. Allowance for twenty-four hours: Bread, 25 oz.; cheese, 2 oz.; butter, suet, or dripping, 2 oz. These yield to analysis: Plastic material, 3·1 oz.; fat, 2·3 oz.; saccharine material, 11·4 oz.

2. Allowance for twenty-four hours: Oatmeal, 16 oz.; milk ½ pint; butter, suet, or dripping, 1 oz. These yield to analysis: Plastic material, 3·0 oz.; fat, 2·3 oz.; saccharine, 9·0 oz.

To each of these diets must be added limejuice or some land vegetable, salt, and a free supply of pure water.

I am, Sir, yours, &c.,

M. D.

Harley Street. Dec. 15th.

VII.

FROM THE PROCEEDINGS OF THE ROYAL SOCIETY, No. 97, 1868.

On the Special Action of the Pancreas on Fat and Starch.

By Horace Dobell, M.D., &c.

I have been engaged for several years in experimenting with the secretion of the pancreas. The enquiry of which I now make known the results has reference especially to the mode of action of the pancreas upon fats—a point which has been the subject of investigation by various physiologists ever since the discovery of the influence of the pancreatic fluid on the absorption of fat by Claude Bernard, nearly twenty years ago.

In the chemical parts of my experiments I owe much to the efficient aid of my friend Mr. Julius Schweitzer, and to the energy and perseverance with which he carried out my suggestions under many difficulties.

The objects of my investigations have been as follows:—

1. To discover the exact character and nature of the influence exerted by the pancreas upon fats.

2. To discover a means of obtaining and preserving the active principles of the pancreas in a form suitable for experiment in the laboratory, and for administration as a remedial agent.

3. To discover the effects of the administration of the active principles of the pancreas as a remedial agent in certain wasting diseases, and to test, by an *experimentum crucis*, the truth of a conclusion on this subject, at which I had previously arrived by a process of inductive research.

I shall not occupy the valuable time of the Society by narrating the many more or less unsuccessful experiments, but restrict myself to a concise record of those attended with success.

Experiments were made with the pancreas of several different animals, but that of the pig was selected for the experiments of which I am about to give the results, as being nearest in the character of its functions to that of the human subject.

In order to ascertain the normal reaction of the pancreatic juice, and whether this is altered by the length of time that has elapsed since the last meal, the following experiment was made with the assistance of Mr. Schweitzer and of Mr. Harris of Calne, who kindly placed his extensive pig-killing establishment at our service for the purpose.

On March 22, 1866, forty pigs were killed, and the pancreas of each examined immediately after death; the killing and examination were so rapidly conducted, that the pancreas was in each case examined while warm from the body; and the killing and examination of the forty pigs in succession occupied less than an hour.

The pigs were killed ten at a time. The first ten had been fed two hours before they were killed, the second ten five hours, the third ten nine hours, and the fourth ten had not been fed for two days.

The pancreas in each group presented the same characters in size, colour, and reaction. Each pancreas was cut through so as to lay open the principal duct, but in no case was there any fluid in the duct. Litmus-paper was applied to the interior of the duct and to the divided gland-cells, and on being pressed sufficiently against the tissues to absorb moisture, the paper was in each case reddened where it was moistened. This acid reaction was not found in the fat and muscles of the animal.

At my request, Dr. Collins examined the reaction of the pancreas in a series of cases at the moment when all the digestive organs were under active excitement. He gave the pigs a good and relishing meal, and while they were eating it, divided the spinal marrow in the neck, so as to destroy sensation in the body. The pigs were immediately cut open, the pancreas removed, and its reaction examined. On August 3rd he wrote me, "As you requested, I have tried a series of experiments upon the pancreas, parotid, and sublingual glands. The two latter have a decidedly acid reaction, but the pancreas I am not quite so certain about; in one batch of pigs killed in Buckinghamshire it was alkaline, but in another lot in Hertfordshire it was acid."

The reaction of the pancreas is always acid when it reaches the laboratory for experiment as quickly as possible after removal from the animal. This we have proved in many hundreds of instances.

To discover the influence of the pancreas upon fat, the fresh pancreas of the pig, freed from all adhering blood and other extraneous matters, was cut into small pieces, bruised, and mixed with lard; and to this mixture water was gradually added. In the bruised condition the pancreas had an acid reaction. By stirring this mixture of pancreas, lard, and water, the fatty character disappeared, a thick, white, creamy fluid being formed, which, on standing, solidified into a firm pasty mass. This mass had also an acid reaction. In order to free it from the *debris* of pancreas, it was pressed through muslin, and a uniform smooth creamy emulsion remained. This emulsion rapidly putrefied, but remained a permanent emulsion until putrefaction set in.

The following are the microscopical characters presented by pure lard before mixture with pancreas, and by this emulsion, which I call "crude emulsion":—

1. "Lard" (pure).—*Aggregations* of ordinary acicular crystals of margarine. No oil-globules. No water.

2. "Crude emulsion."—A tolerably uniform granular mass with *separate* acicular crystals of margarine, oil-globules, and water abundantly distributed throughout the mass. In some places the crystals are aggregated as in No. 1. The granules range from the $\frac{1}{3000}$ to $\frac{1}{15000}$ of an inch in diameter.

This mixture of fat and water differs from all other mixtures or chemical combinations of fat and water in the following particulars.

When the "crude emulsion" is put into ether, the ether separates it into two strata—

a. An ethereal stratum above containing the fat.

b. A watery stratum below.

When the upper stratum (*a*) (ethereal solution of fat) is drawn off and the ether evaporated by a cautiously regulated heat, a pure crystalline fat remains which I call "pancreatized fat." This pancreatized fat has no tendency to putrefy, and will keep for an indefinite period. It presents the following characters under the microscope :—

3. "Pancreatized fat" (lard) consists of minute *separate* acicular crystals of margarine and fine granular matter uniformly distributed. The special character is the *complete loss* of aggregation of the crystals.

This "pancreatized fat" retains the property of mixing or combining with water, and forming a thick, smooth, creamy emulsion, that it possessed in the form of "crude emulsion" before solution in ether. The emulsion formed by mixture of "pancreatized fat" with water I call "purified pancreatic emulsion." It has, like the crude emulsion, an acid reaction, and will keep for a very long time, and presents the following microscopical characters :—

4. "Purified emulsion" (No. 3, spirit and water).—As nearly as possible the same as No. 2; the *separate* crystals more uniformly distributed, and fewer aggregations of them. No globules.*

On analysis of the lower watery stratum (*b*) resulting from the separation of the fat of the crude emulsion by ether, it is found to contain *no glycerine.*

On analysis of the pancreatized fat (3) obtained by evaporating the ether from stratum *a*, it is found that 100 parts of the pancreatized fat are saponified by 54 parts of oxide of lead, and yield 146·25 parts of lead-plaster, and 6·75 parts of glycerine.

It is also found that every 100 parts of lard used in making the crude emulsion produce 106·5 parts of pancreatized fat, the increase of 6·5 parts being solely due to absorption of water, as proved by heating the pancreatized fat, when the water separates, and the pancreatized fat is reconverted into ordinary lard.

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* In cold weather it is necessary to gently warm the glass slide before placing the above specimens upon it, otherwise the solid constituents become agglomerated.

In all the foregoing respects the pancreatic emulsion of fat differs entirely from all other kinds of emulsion of fatty matter, whether chemical or mechanical. All other emulsions of fat are destroyed by ether, the fat being restored at once to its original condition.

The influence exerted by the pancreas upon fats, therefore, appears to operate by breaking up the aggregation of the crystals of the fat. It alters the molecular condition of the fat, mingling it with water in such a way that even ether cannot separate the fat from the water. A permanent emulsion is thus formed ready to mix with a larger quantity of water whenever it may be added.

The pancreas, therefore, in acting upon fat, does not decompose it into fatty acid and glycerine, the absence of the glycerine from the watery stratum (*b*), and the presence of the glycerine in the pancreatized fat of the ethereal stratum (*a*), having been demonstrated.

Action of the pancreas upon starch.—It is well known that, in addition to the influence of the pancreas upon fat, it has the power of converting starch into glycose by simple mixture. This property remains to a certain extent after the pancreas has exhausted its property of acting upon fat. The quantity of pancreas which before mixture with fat will convert about eight parts of starch into glycose, after saturation with fat will still convert about two parts of starch into glycose.

SECOND OBJECT.—To discover a means of preserving the active principles of the pancreas in a form suitable for experiment in the laboratory, and for administration as a remedial agent.

The properties of the pancreas can be extracted from the tissue of the gland by means of water. This watery fluid putrefies very rapidly. It has an acid reaction, a deep yellow colour, coagulates largely by boiling, leaving the colour of the fluid unaltered. It may be precipitated by lead solution, and decomposed again by sulphuretted hydrogen.

When this watery fluid is evaporated, it forms a syrupy extract, which is highly hygroscopic and very difficult to dry.

With great care and trouble, however, it may be dried. For general purposes, the drying is greatly facilitated by adding a dry absorbing-powder, such as powdered malt. For experimental purposes, it may be used in its pure undried state of syrupy extract, but must in that case be used fresh. In the dry state, either pure or mixed with malt-dust, it may be kept good for an indefinite length of time, if protected from moisture in a well-closed bottle. This extract of the pancreas, containing the active principles of the pancreas in the highest degree of efficiency, whether fluid or powdered, I call "PANCREATINE." This term is only used for convenience' sake, and must in no way be understood to signify that the property possessed by it is *single*. All attempts to isolate the several properties of the pancreas into separate products have failed, no one of such products having been found to possess in perfection the property of acting upon fat in the manner described in this paper as peculiar to the pancreas. By the term "PANCREATINE," then, I desire to represent the *entire properties of the pancreas* extracted in a convenient form for keeping, for experiment, and for administration as a remedial agent.

One part of the pure pancreatine dried, without mixture with malt-dust, will digest at least sixteen parts of lard, and enable it to form a thick creamy emulsion, with about 100 parts of water. The emulsion thus formed presents in every respect the characters and qualities of the emulsion produced by the fresh pancreas already described. In this way therefore the active principles of the pancreas may be obtained and preserved in a form suitable for experiment in the laboratory and for administration as a remedial agent.

THE THIRD OBJECT of my investigations has especially occupied my attention in a long series of experiments at the Royal Hospital for Diseases of the Chest. Full details of these and of the results obtained have been published from time to time, during the last four years, in the medical journals; I shall not, therefore, occupy the time of the Society with any account of them in this paper.

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